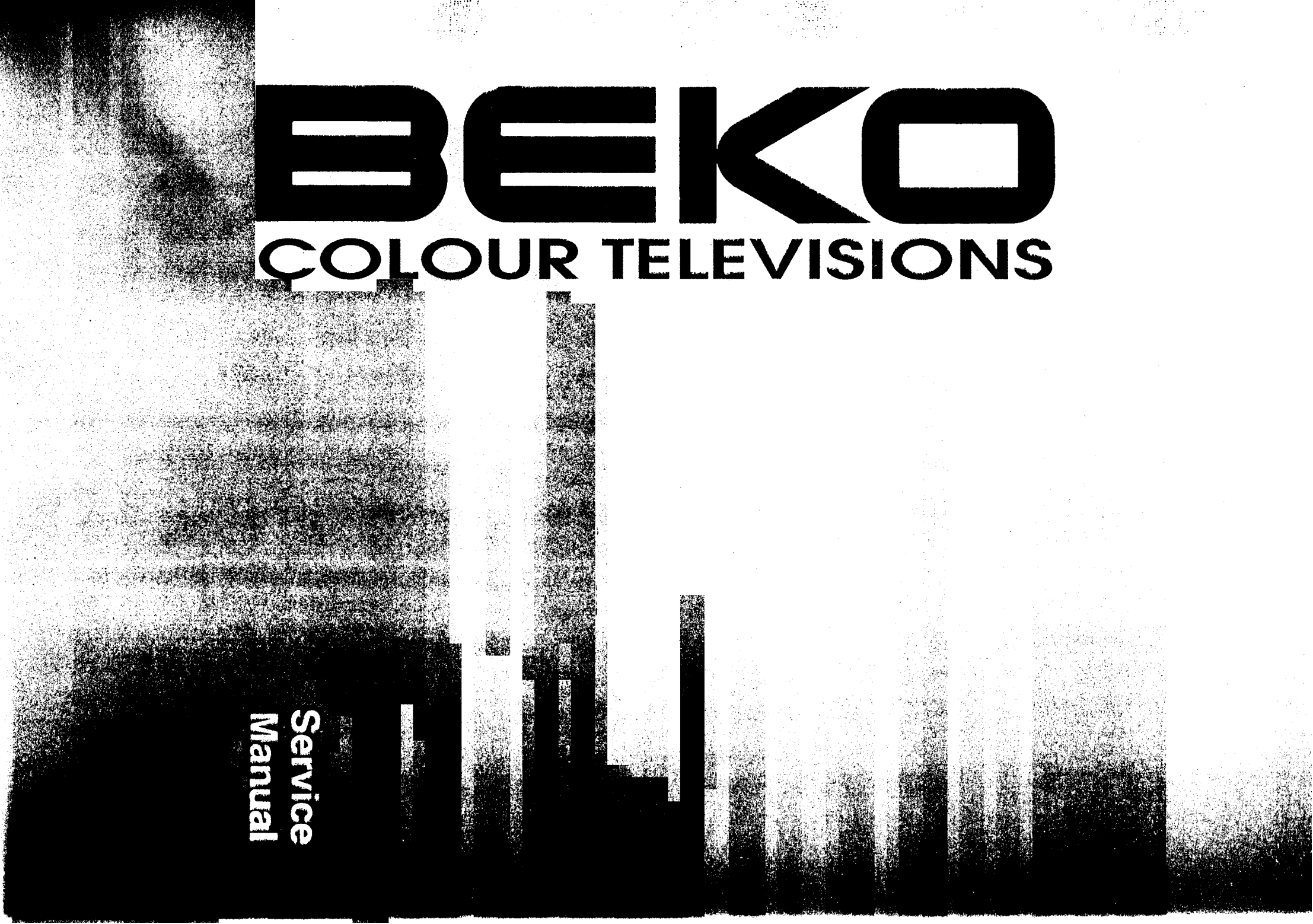
BEKO

COLOUR TELEVISIONS



Service Manual

OPERATION INSTRUCTIONS

CONNECTIONS
Connect the mains plug into the mains socket, 220V AC, 50/60 Hz.

Connect the aerial lead to the aerial socket (75 ohm coaxial) at the back.

ON SCREEN DISPLAY
This function is automatically displayed on the TV screen whenever a control is pressed. It shows you what is happening by a series of graphics moving left (decrease) or right (increase). If you wish the setting to become permanent (normal), press the "MEMORY" button, a prompt message "MEMORY ?" will be displayed on the screen, to confirm, press the "MEMORY" button twice then setting new levels.

TV STANDARD SELECTION
Press the TV-Standard . PAL/SECAM, SECAM DK etc. will be displayed on the screen. After selection press the MEMORY button, a prompt message "MEMORY ?" will be displayed, press MEMORY button once more (Within four seconds) and the selected standard will be stored.

TUNING

METHOD 1:
To select a program, first press SEARCH button and either UP or DOWN buttons. The tuner will automatically search and locate all valid channels being broadcast. To store these individual channels press the button marked MEMORY, a prompt message "MEMORY ?" will be displayed on the screen : Press MEMORY button once more (within four seconds) and that individual channel will be stored in the memory. Repeat operation untill all channels have been found and stored.

METHOD 2:
If the channel numbers are known, obtain "C.." at the upper right corner of the screen by either pressing PR/CH on Remote Control Handset or CHANNEL button on TV set. Select the channel number with Remote Control handset by using ten Key buttons. Press the MEMORY button, a prompt message "MEMORY ?" will be displayed, press MEMORY button once more (within 4 seconds) and that individual channel will be stored in the memory.

FINE TUNING
The button marked "F TUNE" on the television or the handset will allow you to manually gain the optimum reception within the badwidth, should the auto search facility not tune the channel to your satisfaction.

PICTURE ADJUSTMENTS
The following 3 controls should be used in conjunction with each other to give you a well balanced picture without any glare.

Contrast
Press the button marked "CONTRAST" to adjust light and dark shades.

Brightness
Press the button marked "BRIGHT" to ensure overall clarity of definition.

Colour
Press the button marked "COLOUR" to ensure all objects are seen in their natural colours.

VOLUME CONTROL
Press the button marked "VOLUME" on the hadset or "volume + up" on the control panel to increase the volume. By pressing the button marked "volume" or " volume + down", will decrease the volume.

DECADAL CONTROL
The buttons marked "1-, 2-, 3-, are to be used if you require to go to a programme exceding number 9, ie should you require programme 23, press "2- +3" and it will instantly take you to programme 23.

DISPLAY

The button marked "DISPLAY" on the handset, will show the programme number that you are currently viewing, in the top right corner of the television screen.

SLEEP/TIMER

Adjacent to the display button is the TIMER. This will give you the option of automatically switching the television to STANDBY after a period of 30, 60, 90 or 120 minutes. When the word "OFF" is displayed on screen or if the receiver is switched OFF/STANDBY, the timer settings will be cancelled.

MUTE

The button marked "MUTE" on the handset, will prevent any sound being emitted from the speakers, and the word "MUTE" will be displayed on screen until this button has been pressed again, whereupon previous volume levels are restored.

NORMAL SETTINGS

When the receiver is first switched ON or whenever the "NORMAL" button is pressed., all picture and sound adjustments should be as you -prefer them- this is provided that you have initially adjusted them to your satisfaction and stored these settings in the electronic memory. They will always revert to these settings even if temporarily altered to suit unusual reception conditions etc (provided the temporary settings have not been memorised).

MEMORY / STORE

This button, when pressed twice (within 4 seconds), will override any previous control setting if used in conjunction with a particular control. To memorise any alteration, press the "MEMORY" BUTTON once, the receiver will advise it will accept this command by displaying "memory?", to confirm press "MEMORY" once more. This new setting will then be regarded as permanent or normal.

STANDBY

The button marked " ⏻ " allows you to switch the television to "standby". This control shuts down all functions except a sensory circuit. To return to television programmes either press the standby button again or key in a valid programme number by using the numeric pad on the handset. It should be noted that the television is "not" switched off in this mode. If you are not going to use the television for long periods of time, it is recommended that you switch the power on the television to "OFF" and remove the mains plug from the socket.

AUDIO VIDEO CONNECTIONS

When the button marked "AV" is pressed, it enables you to connect most types of VCR's, Computers and Satellite Receivers to this television, either directly to the aerial socket or by the SCART connector.

SCART - EUROSOCKET

The term SCART or Eurosocket is a 21 pin connector, recognised by International Standards, which will allow you to connect any relevant equipment, regardless of make or country or origin, to this television and will operate according to manufacturers specification.

VIDEO CONNECTION

This television has been produced so that a video recorder can be connected direct to the aerial socket, by using the standard co-axial lead supplied with all makers V.C.R.

Follow the instructions from the VCR to connect the 2 units togethernd switch on the VCR's test signal or play a pre-recorder video cassette. Tune the television to the signal from the VCR. This will usually be either channel 36 or 37, however, check the information plate at the rear of the VCR. Although you can store the video tuning position to any channel, we suggest that you store the video on channel "0", to prevent any confusion of possible new channel additions.

It should be noted that some makers of VCR's, Computers and Satellite receivers etc, will automatically switch the television into "AV" mode. If this happens then you must obviously disregard the previous instruction to manually select "AV".

CIRCUIT DESCRIPTIONS

1.1 GENERAL

Chassis AT-2 has a modular designed frequency synthesis tuning and control system which can be used in a wide range of TV receivers. The system involves frequency tables of standars B/G-D/K channels.
The basic system, providing 40 permanently stored programmes, local control of main TV functions and display of programme, channel number and analogue values on the screen (OSD) can be realized with only four integrated circuits.:

Microcontroller	SDA 20160
Nonvolatile memory	SDA · 2526
OSD-IC (NEC)	6142

IR remote control of all TV functions is possible if two additional ICs are used:

IR TRANSMITTER	SDA 2208
IR PREAMPLIFIER	SDA 4050B

Teletext function may be included by using the following devices:

Data slicer	SDA5231
Teletext decoder	SDA5243
Memory device	8k*8

1.2 SALIENT FEATURES

Frenguency synthesis tuning (62.5kHz steps)
Channels correspending to standard B/G · D/K.
Software protection against tube flashovers
40 programs selectable by directly entering a programme number or by up/down function.
Channel selection by directly entering a channel number or up/down function.
Channel search function in two directions.
Nonvolatile memory for 40 programme and optimal analogue values.
128 step fine tuning.
Local control (14/13 Keys)
IR remote control
Control lines for AV (programmes 0,AV,39)
Display of programme number, channel number, analogue values, mute illustrated by OSD (On screen display).
Automatic muting if no carrier detected.
Automatic switch-off when carrier disappears for more than 5 minutes
Sleep-timer (30,60,90, 120 min)
Full telext control
Linked page control (row 27)
Pin programmable tuner-selection
Broadcasting standard selection.

1.3 CONTROL COMPONENTS

In the following sections abbreviated reference data of the control components is given. For more detailed information use corresponding data sheets.

1.3.1 MICROCONTROLLER SDA 20160

The SDA20160 is an one-chip microcontroller with an 8 bit CPU, 16 kByte code memory (ROM), 256 byte date memory (RAM), two independent 16 bit timers/counters, a five-source/two-priority-level nester interrupt structure and four on chip D/A converters. Manufactured in NMOS silicon gate technology and working with a single 5 Volt supply voltage it has a cycle time of 1 S (crystal frequency 12MHz) with one, two or four cycles per instruction. A total of up to 34 digital I/0 lines are available, configurated as four 8 bit ports (port0 to port3) and the serial IIC bus interface with clock (SCL) and data (SDA) line. Port 3 is a multifunction port. All special functions can be enabled/disabled by software. P3.0 input is able to process signals modulated with approx. 30 kHz. It contains a digital demodulator deriving the envelope curve from a modulated digitial signal and can be used as an input for infrared transmitter signals. Further port3 includes two interrupt inputs and two counter inputs. Port 1 also contains four multifunction lines which can be used either as normal port input/output or as PWM (pulse width modulated) outputs, controlled by the four on-chip D/A converters. For the application a special software has been located in the microcontroller ROM. Fig1 shows a pinning diagram of the SIESTA-OSD microcontroller, named SDA 20160. The SDA 20160 microcontroller is housed in a DIP 40 package.

1.3.2 NONVOLATILE MEMORY SDA 2516/2526

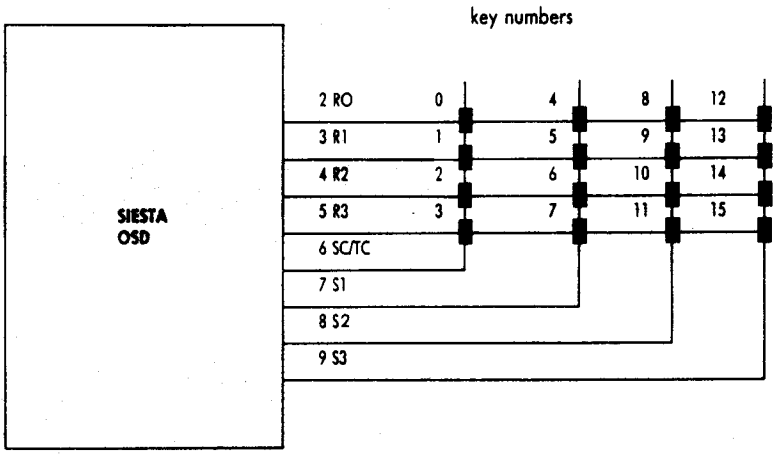
The SDA 2516 and SDA 2526 are nonvolatile, electrically programmable and eraseable memory devices 128* 8 bit rsp. 256 * 8 bit (SDA 2526) memory size. Data transfer is done via an IIC bus interface. Programming time is typically 15ms. Data retention is unlimited and independent of power-on or power-off status. The number of reprogramming cycles per address is greater than 1000. SDA 2516 and SDA 2526 are manufactured in MOS technology and mounted in a DIP 8 case.

1.3.3 INFRARED PREAMPLIFIER TDA 4060

The bipolar integrated circuits TDA 4060 is designed for universal use as preamplifier for infrared remote control signals. The TDA 4060 uses only a single 5V supply.

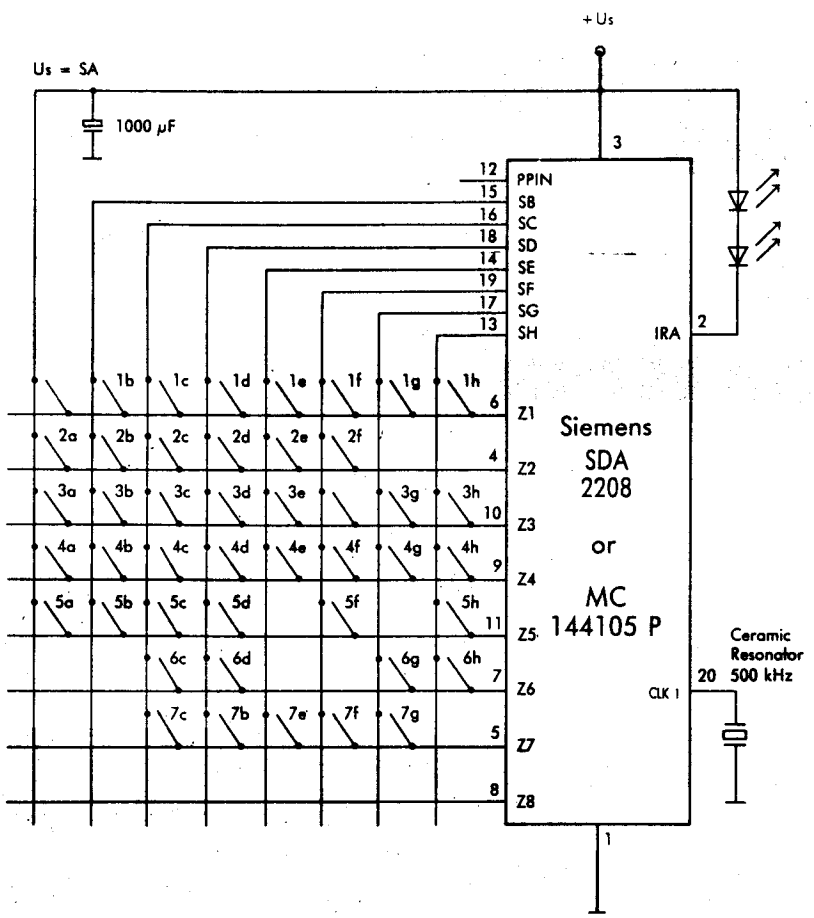
1.3.4 IR TRANSMITTER SDA 2208

The IR transmitter circuit SDA 2208, manufactured in a bipolar technology converts instructions obtained from an 8*§ keyboard matrix to a 9 bit bipolar phase code. The keyboard matrix could be enlarged to an 8*64 array by means of shift keys or additional working, so a total of 512 different instructions could be transmitted. As including an on-chip IR diode driver, the IR transmitter diode (s) are directly connected to the SDA 2208. The keyboard is completely locked against multiple closure. The internal oscillator is controlled by an AM-IF ceramic resonator or by an existing clock signal (430..530kHz). Current consumption during operation is typically 10mA (supply voltage 4...10V) When no key on the board is pressed (standby) the SDA 2208 is produced in a DIP 20 case.

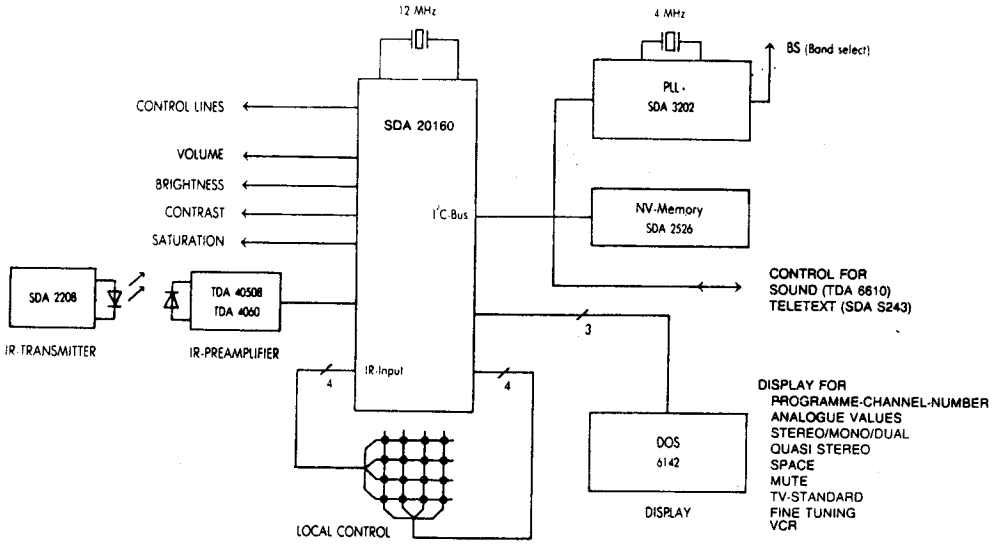


key no.	Function
1	off/on
2	store
3	down
4	up
5	AF mode
6	search
7	channel
8	programme
9	scart
10	volume
11	TV-standard
12	finetuning
13	saturation
14	contrast
15	brightness

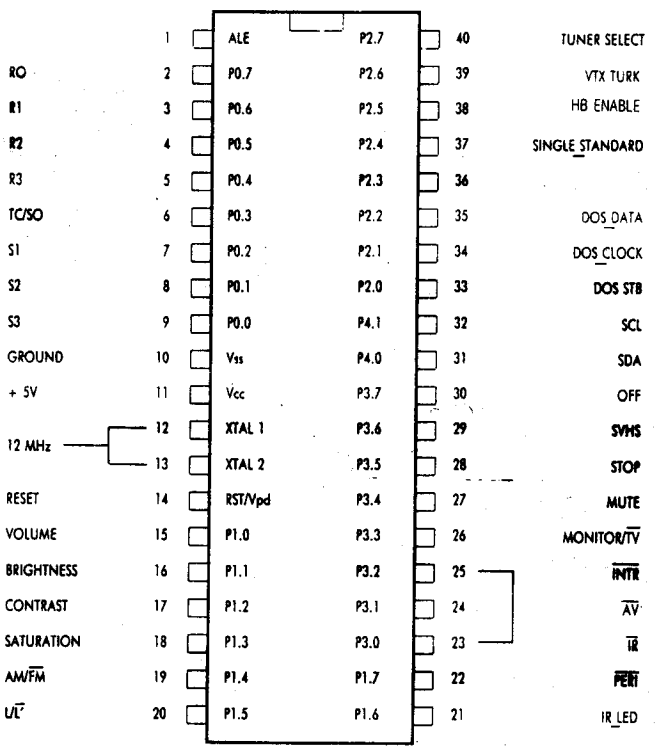
LOCAL CONTROL BLOCK DIAGRAM



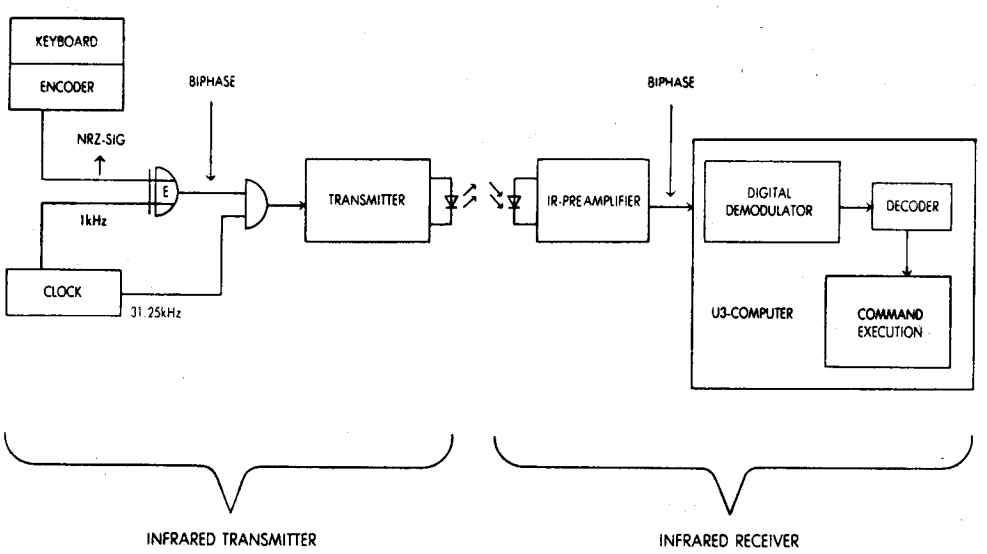
CIRCUIT FOR IR TRANSMITTER SDA 2208



SYSTEM BLOCK DIAGRAM


1 ALE P2.7 40 TUNER SELECT
RO 2 P0.7 P2.6 39 VTX TURK
R1 3 P0.6 P2.5 38 HB ENABLE
R2 4 P0.5 P2.4 37 SINGLE STANDARD
R3 5 P0.4 P2.3 36
TC/SO 6 P0.3 P2.2 35 DOS DATA
S1 7 P0.2 P2.1 34 DOS CLOCK
S2 8 P0.1 P2.0 33 DOS STB
S3 9 P0.0 P4.1 32 SCL
GROUND 10 Vss P4.0 31 SDA
+ 5V 11 Vcc P3.7 30 OFF
12 MHz 12 XTAL 1 P3.6 29 SVHS
13 XTAL 2 P3.5 28 STOP
RESET 14 RST/Vpd P3.4 27 MUTE
VOLUME 15 P1.0 P3.3 26 MONITOR/TV
BRIGHTNESS 16 P1.1 P3.2 25 INTR
CONTRAST 17 P1.2 P3.1 24 AV
SATURATION 18 P1.3 P3.0 23 IR
AM/FM 19 P1.4 P1.7 22 PERI
U/L 20 P1.5 P1.6 21 IR LED

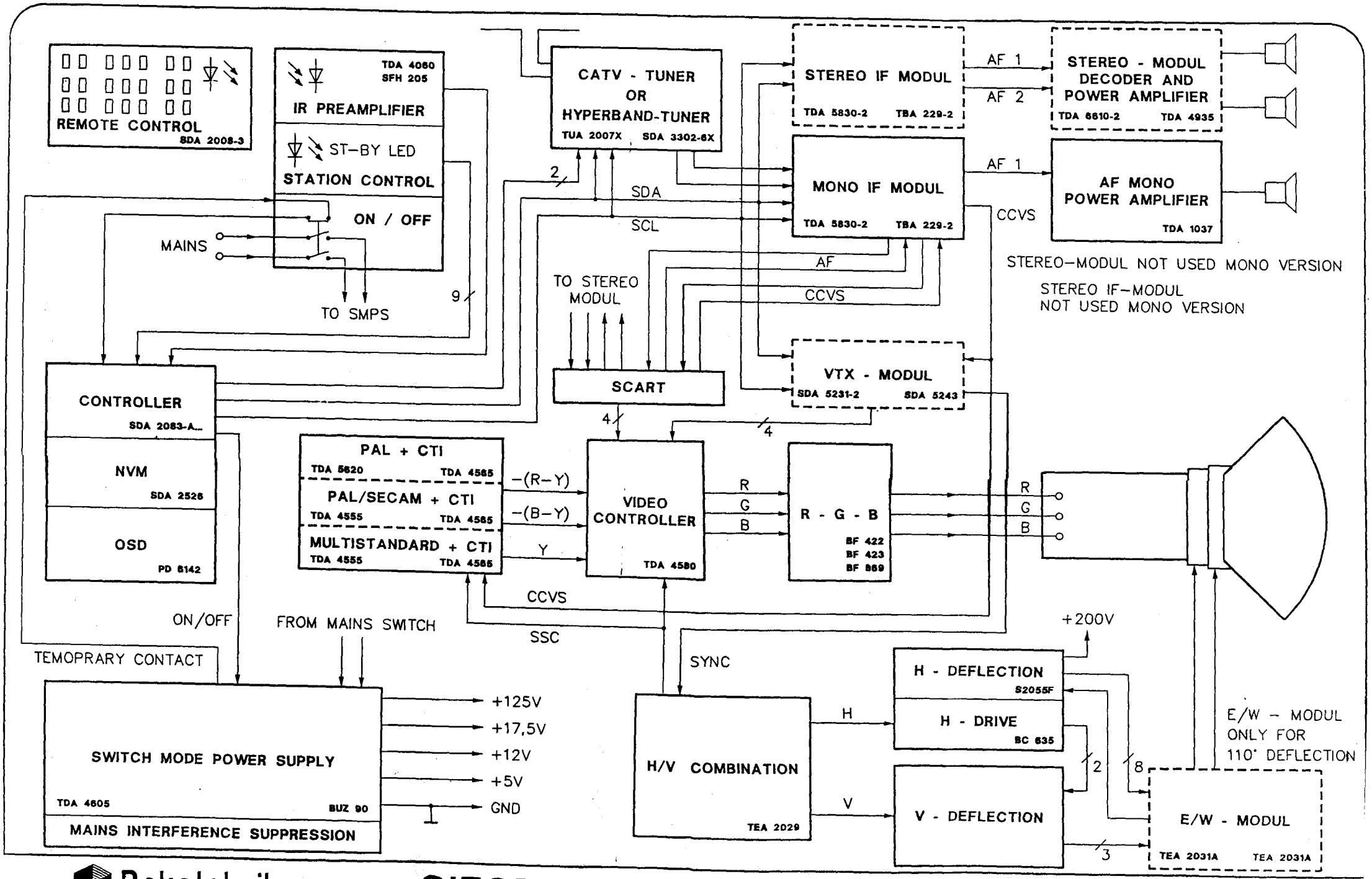
MICROCONTROLLER PIN CONFIGURATION



IR REMOTE CONTROL BLOCK DIAGRAM

CHANNEL TABLE FOR STANDARD B/G (CCIR)

Channel number (display)	Channel design.	Centre frequency (MHz)	Oscillator frequency (MHz)	Division ratio PLL (decimal)
01	AU 0	46.25	85.125	1,362
02	K2	48.25	87.125	1,394
03	K3	55.25	94.125	1,506
04	K4	62.25	101.125	1,618
05	K5	175.25	214.125	3,426
06	K6	182.25	221.125	3,538
07	K7	189.25	228.125	3,650
08	K8	196.25	235.125	3,762
09	K9	203.25	252.125	3,874
10	K10	210.25	249.125	3.986
11	K11	217.25	256.125	4,098
12	K12	224.25	263.125	4,210
13	A	53.75	92.625	1,482
14	B	62.25	101.125	1,618
15	C	82.25	121.125	1,938
16	D	175.25	214.125	3,426
17	E	183.75	222.625	3,562
18	F	192.25	231.125	3.698
19	G	201.25	240.125	3.842
20	H	210.25	249.125	3.986
21	K21	471.25	510.125	8,162
22	K22	479.25	518.125	8,290
23	K23	487.25	526.125	8,418
24	K24	495.25	534.125	8,546
25	K25	503.25	542.125	8,674
26	K26	511.25	550.125	8,802
27	K27	519.25	558.125	8,930
28	K28	527.25	566.125	9.058
29	K29	535.25	574.125	9,186
30	K30	543.25	582.125	9,314
31	K31	551.25	590.125	9,442
32	K32	559.25	598.125	9.570
33	K33	567.25	606.125	9,698
34	K34	575.25	614.125	9,826
35	K35	583.25	622.125	9,954
36	K36	591.25	630.125	10,082
37	K37	599.25	638.125	10,210
38	K38	607.25	646.125	10,338
39	K39	615.25	654.125	10,466
40	K40	623.25	662.125	10,594
41	K41	631.25	670.125	10,722
42	K42	639.25	678.125	10,850
43	K43	647.25	686.125	10,978
44	K44	655.25	694.125	11,106
45	K45	663.25	702.125	11,234
46	K46	671.25	710.125	11,362
47	K47	679.25	718.125	11,490
48	K48	687.25	726.125	11,618
49	K49	695.25	734.125	11,746
50	K50	703.25	742.125	11,874
51	K51	711.25	750.125	12,002
52	K52	719.25	758.125	12,130
53	K53	727.25	766.125	12,258
54	K54	735.25	774.125	12,386
55	K55	743.25	782.125	12,514
56	K56	751.25	790.125	12,642
57	K57	759.25	798.125	12,770
58	K58	767.25	806.125	12,898
59	K59	775.25	814.125	13,026
60	K60	783.25	822.125	13,154
61	K61	791.25	830.125	13,282
62	K62	799.25	838.125	13,410
63	K63	807.25	846.125	13,538
64	K64	815.25	854.125	13,666
65	K65	823.25	862.125	13,794
66	K66	831.25	870.125	13,922
67	K67	839.25	878.125	14,050
68	K68	847.25	886.125	14,178
69	K69	855.25	894.125	14,306
70	EX	863.25	902.125	14,434
71	EX	871.25	910.125	14,562
72	EX	879.25	918.125	14,690
73	EX	887.25	926.125	14,818
74	EX	69.25	108.125	1,730
75	EX	76.25	115.125	1,842
76	EX	83.25	122.125	1,954
77	EX	90.25	129.125	2,066
78	EX	97.25	136.125	2,178
79	20I	59.25	98.125	1,570
80	50I	93.25	132.125	2,114
81	S1	105.25	144.125	2,306
82	S2	112.25	151.125	2,418
83	S3	119.25	158.125	2,530
84	S4	126.25	165.125	2,642
85	S5	133.25	172.125	2,754
86	S6	140.25	179.125	2,866
87	S7	147.25	186.125	2,978
88	S8	154.25	193.125	3,090
89	S9	161.25	200.125	3,202
90	S10	168.25	207.125	3,314
91	S11	231.25	270.125	4,322
92	S12	238.25	277.125	4,434
93	S13	245.25	284.125	4,546
94	S14	252.25	291.125	4,658
95	S15	259.25	298.125	4,770
96	S16	266.25	305.125	4,882
97	S17	273.25	312.125	4,994
98	S18	280.25	319.125	5,106
99	S19	287.25	326.125	5,218
00	S20	294.25	333.125	5,330
C0	S21	303.25	342.125	5,474
C1	S22	311.25	350.125	5,602
C2	S23	319.25	358.125	5,730
C3	S24	327.25	366.125	5,858
C4	S25	335.25	374.125	5,986
C5	S26	343.25	382.125	6,050
C6	S27	351.25	390.125	6,242
C7	S28	359.25	398.125	6,370
C8	S29	367.25	406.125	6,498
C9	S30	375.25	414.125	6,626
CC	S31	383.25	422.125	6,754
E0	S32	391.25	430.125	6,882
E1	S33	399.25	438.125	7.010
E2	S34	407.25	446.125	7,138
E3	S35	415.25	454.125	7,266
E4	S36	423.25	462.125	7,394
E5	S37	431.25	470.125	7,522
E6	S38	439.25	478.125	7,650
E7	S39	447.25	486.125	7,778
E8	S40	455.25	494.125	7,906
E9	S41	463.25	502.125	8,034



Bokotoknik SIESTA BLOCKDIAGRAMM

SAFETY INSTRUCTIONS

SAFETY-PRECAUTIONS

WARNING: The following precautions should be observed.

1. Although the chassis is isolated from the mains supply, some areas of the main PCB are at mains potential. An isolation transformer (250-500 VA) should therefore be connected between the mains and the receiver before service is attempted.

2. Do not install, remove, or handle the picture tube in any manner unless safety, goggles are worn. People not equipped should be kept away while picture tubes are handled. Keep the picture tube away from the body while handling.

3. When replacing chassis in the cabinet, ensure all the protective devices are put back in place, such as: barriers, non-metallic knobs, adjustments and compartment cover or shields, isolation resistor-capacitor, etc.

4. When service is required note the original lead locations and anchor points. Ensure all leads, especially in areas of high voltage, are routed/anchored in their correct locations when reassembling the receiver.

5. Always use the manufacturer's replacement component. Always replace original spacers and maintain lead lengths. Especially critical components which should not be replaced by other makers. Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.

6. Before returning a serviced receiver to the customer, the service technician must throughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently damaged during servicing. Therefore, the following checks are recommended for the continued protection of customers and service technicians.

INSULATION

Insulation resistance should not be less than 10M at 500V DC between the mains poles and any accessible metal parts.
Also, no flashover or breakdown should occur during the dielectric strength test applying 3kV AC or 4.25kV DC for two seconds between the main poles and accessible metal parts

HIGH VOLTAGE

High voltage should always be kept at rated value of the chassis and no higher. Operating at higher voltage may cause a failure of the picture tube or high voltage supply and also, under certain circumstances could produce x-ray radiation moderately in eexcess of design levels. The high voltage must not, under any circumstances exceed 26 kV on the chassis.

X-RAY RADIATION

TUBES: The primary source of x-ray radiation in this receiver is the picture tube. the tube utilised for the above mentioned function in this chassis is specially constructed to limit x-ray radiation for continued x-ray radiation protection, replace tube with the same type as the original BEKO approved type.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in BEKO television receivers have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified by marking with a ⚠ on the schematics and replacement parts list in this Service Manual.
The use of a substitute replacement component which does not have the same safety characteristics as the BEKO recommended replacement one, shown in the parts list in this Service Manual, may create electrical shock, fire, X-radiation, or other hazards.

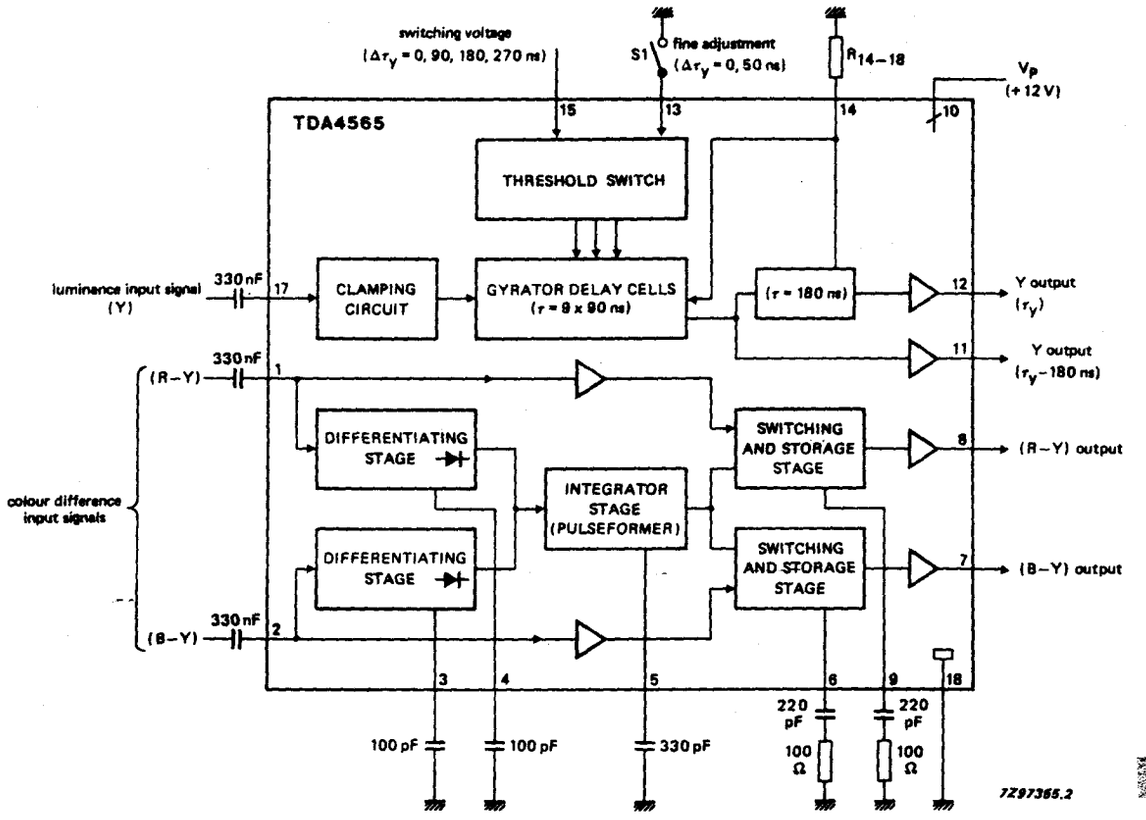
TUBE DISCHARGE

The line output stage can develop voltages in excess of 25kV; if the E.H.T. cap is required to be removed, discharge the anode cap to chassis via a high value resistor, prior to its removal from the tube.

TDA 4565 COLOUR TRANSIENT IMPROVEMENT CIRCUIT

GENERAL DESCRIPTION

The TDA 4565 is a monolithic integrated circuit for coulour transient improvement (CTI) and luminance delay line in gyrator technique in colour television receivers.



Features

- Colour transient improvement for colour difference signals (R-Y) and (B-Y) with transient detecting, store- and switching stages resulting in high transients of colour difference output signals.

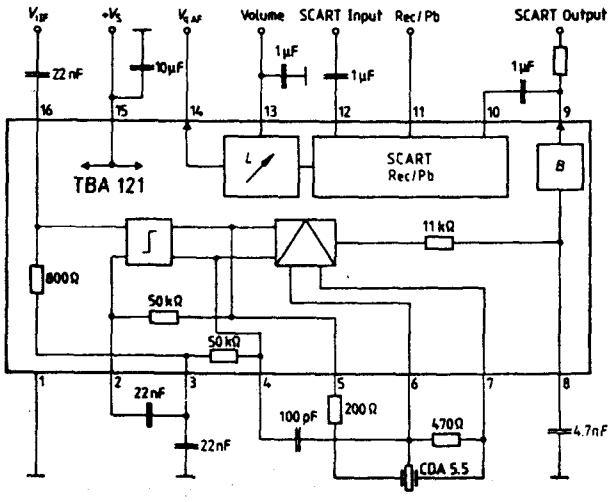
- A luminance -signal path (Y) which substitutes the conventional Y-delay coil with an integrated Y-delay line.

- Switchable delay time from 730 ns to 1000 ns in steps of 90 ns and additional fine adjustment of 50 ns

- Two Y output signals; one of 180 ns less delay

TBA 121 FM Sound IF with SCART Switch and Volume Control

Blok Diagram



Features

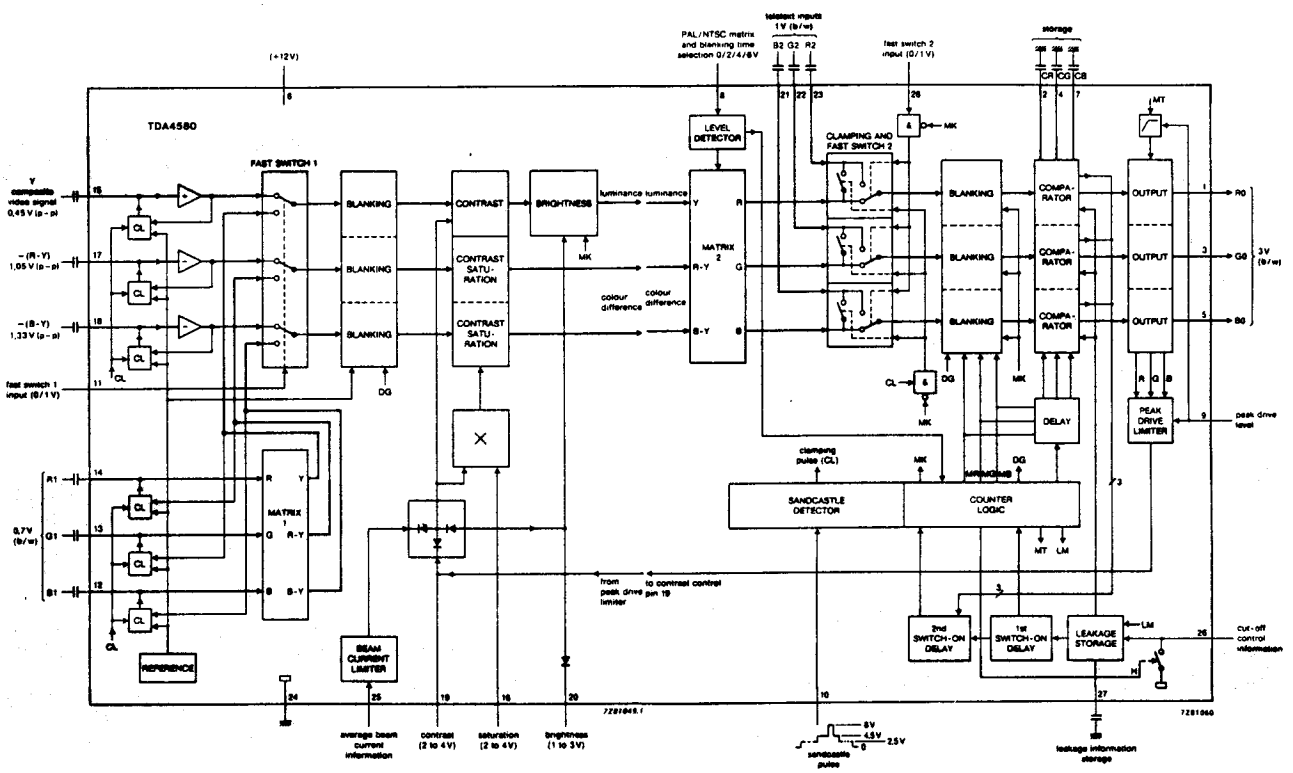
- Outstanding limiting qualities
- Few external components
- Integrated deemphasis resistor
- Low harmonic distorsion factor

PIN FUCTIONS

Pin No.	Function
1.	Ground
2.	Limiter amplifier operating point feedback
3.	Limiter amplifier operating point feedback and low end
4.	IF amplifier output (emitter follower)
5.	IF amplifier output (emitter follower)
6.	Demodulator input with high impedance input and internal 15 kΩ supply resistor
7.	Demodulator input with high impedance input and internal 15 kΩ supply resistor
8.	Connection for demphasis capacitor
9.	AF output of the SCART interface
10.	AF input 1 of the SCART interface (IF branch)
11.	Rec/Pb switch input
12.	AF input 2 of the SCART interface (SCART input)
13.	Volume control
14.	IF output (emitter follower)
15.	Supply voltage
16.	IF input

In its FM section the device incorporates an eight,stage-balanced limiter amplifier followed by a coincidence demodulator. The AF section includes an analog switch for the SCART record/playback function and an analog volume control with AF output..

TDA4580 VIDEO CONTROL COMBINATION CIRCUIT
With automatic cut-off control

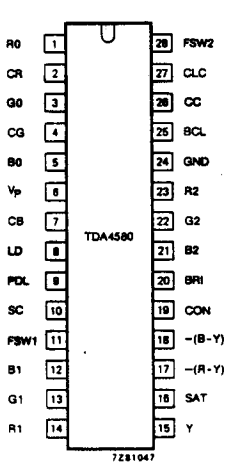


GENERAL DESCRIPTION

The TDA4580 is a monolithic integrated circuit which performs video control functions in television receivers with a colour difference interface. For example it operates in conjunction the multistandard colour decoder TDA4555. The required input signals are: luminance and negative colour difference -(R-Y) and (B-Y), and a 3-level sandcastle pulse for control purposes. Analogue RGB signals can be inserted from two sources. One with full performance adjustment possibilities. RGB output signals are available for driving the video output stages. This circuit provides automatic cut-off control of the picture tube.

Features

- Capacitive coupling of the colour difference, luminance and RGB input signals with black level clamping
- Two sets of analogue RGB inputs via fast switch 1 and fast switch 2
- First RGB inputs and fast switch 1 in accordance with peritelevision connector specification
- Saturation, contrast and brightness control acting on first RGB inputs.
- Brightness control acting on second RGB inputs.
- Equal black levels for television and inserted signals.
- Clamping, horizontal and vertical blanking, and timing of automatic cut-off, controlled by a 3-level sandcastle pulse
- Automatic cut-off control with compensation for leakage current of the picture tube
- Measuring pulses of cut-off control start immediately after end of vertical part of sandcastle pulse
- Three selectable blanking intervals for PAL, SECAM and NTSC/PAL-M
- Two switch-on delays for run-in without discolouration
- Adjustable peak drive limiter
- Average beam current limiter
- G-Y and RGB matrix coefficients selectable for PAL/SECAM and NTSC (correction for FCC primaries)
- Bandwith 10 MHz (typ.)
- Emitter-follower outputs for driving the RGB output stages

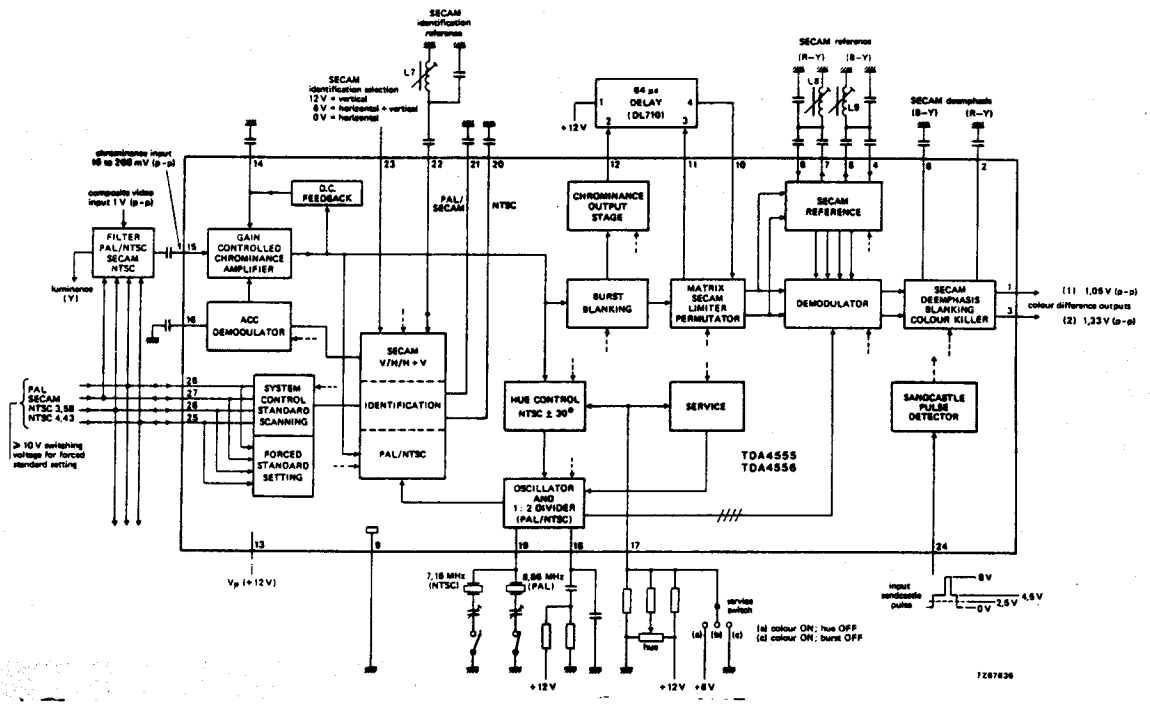


PINNING

pin no.	mnemonic	description
1	RO	Red output
2	CR	Red storage capacitor for cut-off control
3	GO	Green output
4	CG	Green stroge capacitor for cut-off control
5	BO	Blue output
6	Vp	Positive supply voltage
7	CB	Blue storage capacitor for cut-off control
8	LD	PAL/NTSC matrix and blanking time level detector input
9	PDL	Peak drive limiting input
10	SC	Sandcastle pulse input
11	FSW1	Fast switch 1 for Y, CD and RGB inputs
12	B1	Blue input (external signal)
13	G1	Green input (external signal)
14	R1	Red input (external signal)
15	Y	Luminance input
16	SAT	Saturation control input
17	-(R-Y)	Colour difference input-(R-Y)
18	-(B-Y)	Colour difference input-(B-Y)
19	CON	Contrast control input
20	BRI	Brightness control input
21	B2	Teletext blue input
22	G2	Teletext green input
23	R2	Teletext red input
24	GND	Ground
25	BCL	Average beam current limiting input
26	CC	Automatic cut-off control input
27	CLC	Storage capacitor for leakage current
28	FSW2	Fast switch 2 for teletext inputs

TDA 4555 MULTISTANDART DECODER

The TDA4555 is a monolithic integrated multistandard colour decoder for PAL, SECAM, NTSC 3.58 MHz and NTSC 4.43 MHz standard.



FEATURES

Crominance part includes gain controlled chrominance amplifier and ACC rectifier circuits for PAL, SECAM and NTSC. Crominance output stage drives the 64 µs glass delay line (Pal, Secam). There are SECAM permutater and limited stages for direct and delayed SECAM SIGNAL.

Demodulator part PAL switch, internal PAL matrix, de-emphasis, two guadrate demodulators with external reference tuned circuits (SECAM). Flyback blanking incorporated in the two synchonous demodulators (PAL, NTSC), and residual carrier is filtered internaly.

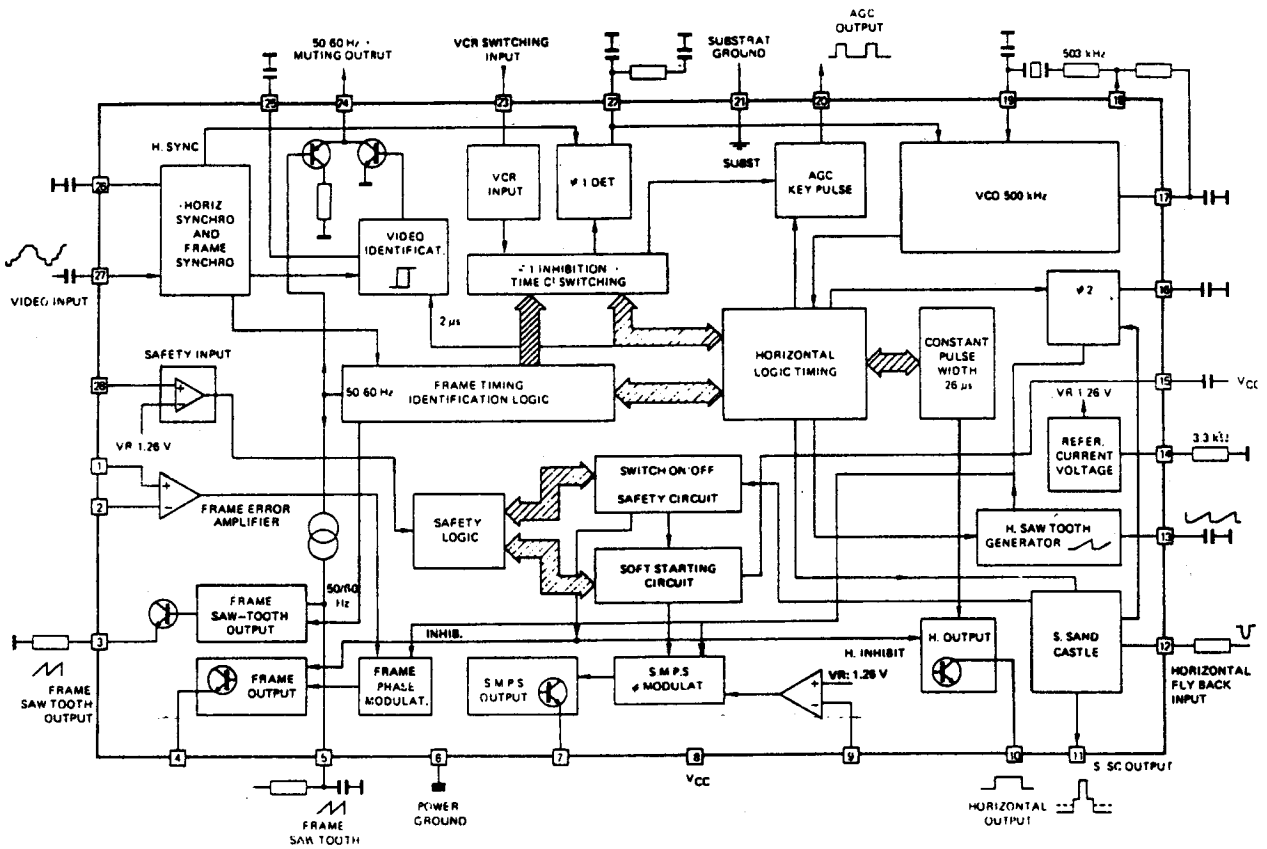
Identification part performs automatic standard recognition by sequential inquiry, delay for colour-on and scanning-on. SECAM identification is reliable by PAL priority circuit. Forced switch-on is possible. IC includes two identification circuit for PAL/SECAM (H/2) and NTSC and PAL/SECAM flip-flop. Crystal oscillator includes divider stages and PLL circuity (PAL, NTSC) for double colour subcarrier frequency.

TEA2029 C COLOUR TV SCANNING AND POWER SUPPLY PROCESSOR

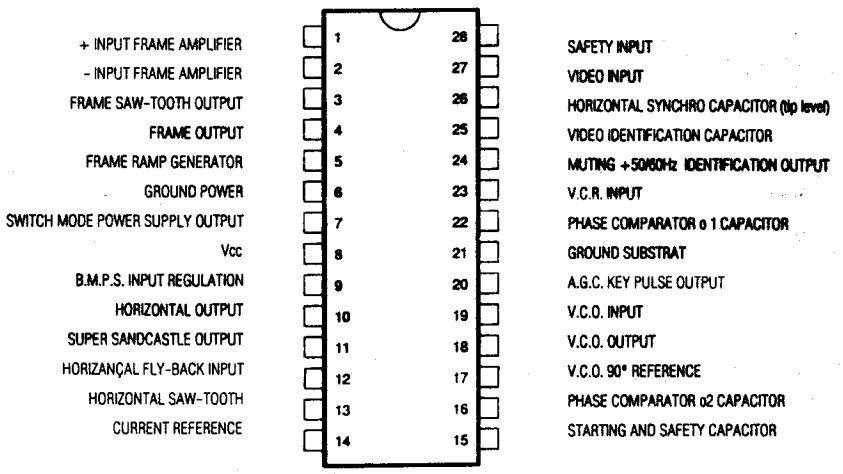
DESCRIPTION

The TEA2029 is a complete (horizontal and vertical) deflection processor with secondary to primary SMPS control for color TV sets.

BLOCK DIAGRAM



PIN CONNECTIONS



GENERAL DESCRIPTION

This integrated circuit uses I^2L bipolar technology and combines analog signal processing with digital processing.
Timing signals are obtained from a voltage-controlled oscillator (VCO) operating at 500KHz by means of a cheap ceramic resonator. This avoids the frequency adjustment normally required with line and frame oscillators.
A chain of dividers and appropriate logic circuitry produce very accurately defined sampling pulses and the necessary timing signals.
The principal functions implemented are:

- Horizontal scanning processor.
- Frame scanning processor. Two applications are possible:

- D Class Power stage using an external thyristor.
- B Class Power stage using an external power amplifier with fly-back generator such as the TDA8170

- Secondary switch mode power regulation. The SMPS output synchronize a primary I.C. (TEA2164 or TEA2260/61) at the mains part. This concept allows ACTIVE STANDBY facilities.
- Dual phase-locked loop horizontal scanning.
- High performance frame and line synchronization with interlacing control.
- Video identification circuit.
- Super sandcastle.
- AGC key pulse output..
- Automatic 50-60Hz standard identification.
- VCR input for PLL time constant and frame synchro switching.
- Frame saw-tooth generator and phase modulator.
- Switching mode regulated power supply, comprising error amplifier and phase modulator.
- Security circuit and start-up processor.
- 500KHz VCO.

The circuit is supplied in a 28 pin DIP case.
Vcc = 12V.

SYNCHRONIZATION SEPARATOR

Line synchronization separator is clamped to black level of input video signal with synchronization pulse bottom level measurement.
The synchronization pulses are divided centrally between the black level and the synchronization pulse bottom level, to improve performance on video signals in noise conditions.

FRAME SYNCHRONIZATION

Frame synchronization is fully integrated (no external capacitor required).
The frame timing identification logic permits automatic adaptation to 50 - 60 Hz standard or non-interlaced video.
An automatic synchronization window width system provides:

- fast frame capture (6.7 ms wide window).
- good noise immunity (0.4ms narrow window).

The internal generator starts the discharge of the saw-toth generator capacitor so that it is not disturbed by line fly back effects.
Thanks to the logic control, the beginning of the charge phase does not depend on any disturbing effect of the line fly-back.
A 32µs timing is automatically applied on standardized transmissions, for perfect interlacing.
In VCR mode, the discharge time is controlled by an internal monostable independent of the line frequency and gives a direct frame synchronization.

HORİZONTAL SCANNING

The horizontal scanning frequency is obtained from the 500kHz VCO.
The circuit uses two phase-locked loops (PLL):
the first one controls the frequency, the second one controls the relative phase of the synchronization and line fly-back signals.

The frequency PLL has two switched time constants to provide:
- capture with a short time constant.
- good noise immunity after capture with a long time constant.

The output pulse has a constant duration of 26µs, independent of Vcc and any delay in switching off the scanning transistor.

VIDEO IDENTIFICATION

The horizontal synchronization signal is sampled by a 2µs pulse within the synchronization pulse. The signal is integrated by an external capacitor.
The identification function provides three different levels:
- 0V : no video identification
- 6V : 60Hz video identification
- 12V : 50Hz video identification

This information may be used for timing research in the case of frequency or voltage synthetizer type receivers, and for audio muting.

SUPER SANDCASTLE with 3 levels : burst, line flyback, frame blanking.
In the event of vertical scanning failure, the frame blanking level goes high to protect the tube.
Frame blanking time (start with reset of Frame divider) is 24 lines.

VCR INPUT

This provides for continuos use of the short time constant of the first phase-locked loop (frequency).
In VCR mode, the frame synchronization window widens out to search window and there is no delay of frame fly-back (direct synchronization).

FRAME SCANNING

FRAME SAW-TOOTH GENERATOR. The current to charge the capacitor is automatically switched to 60Hz operation to maintain constant amplitude.
Frame phase modulator (With two differential inputs). The output signal is a pulse at the line frequency, pulse width modulated by the voltage at the differential pre-amplifier input.
This signal is used to control a thyristor which provides the scanning current to the yoke. The sawtooth output is a low impedance, however, and can therefore be used in class B operation with a power amplifier circuit.

SWITCH MODE POWER SUPPLY (SMPS) SECONDARY TO PRIMARY REGULATION

This power supply uses a differential error amplifier with an internal reference voltage of 1.26 and a phase modulator operating at the line frequency. The power transistor is turned off by the falling edge of the horizontal saw-tooth.

The "soft start" device imposes a very small conduction angle on starting up, this angle progressively increases to its nominal regulation value.

The maximum conduction angle may be monitored by forcing a voltage on pin 15. This pin may also be used for current limitation.

SECURITY CIRCUIT AND START UP PROCESSOR

When the security input (pin 28) is at a voltage exceeding 1.26V the three outputs are simultaneously cut off until this voltage drops below the 1.26 V thresholdu again. In this case the switch mode power supply is restarted by the "soft start" system.

If this cycle is repeated three times, the three outputs are cut off definitively. To reset the safety logic circuits, Vcc must be zero volt.

This circuit eliminates the risk to switch OFF the TV receiver in the event of a flash affecting the tube.

TELETEXT MODULE

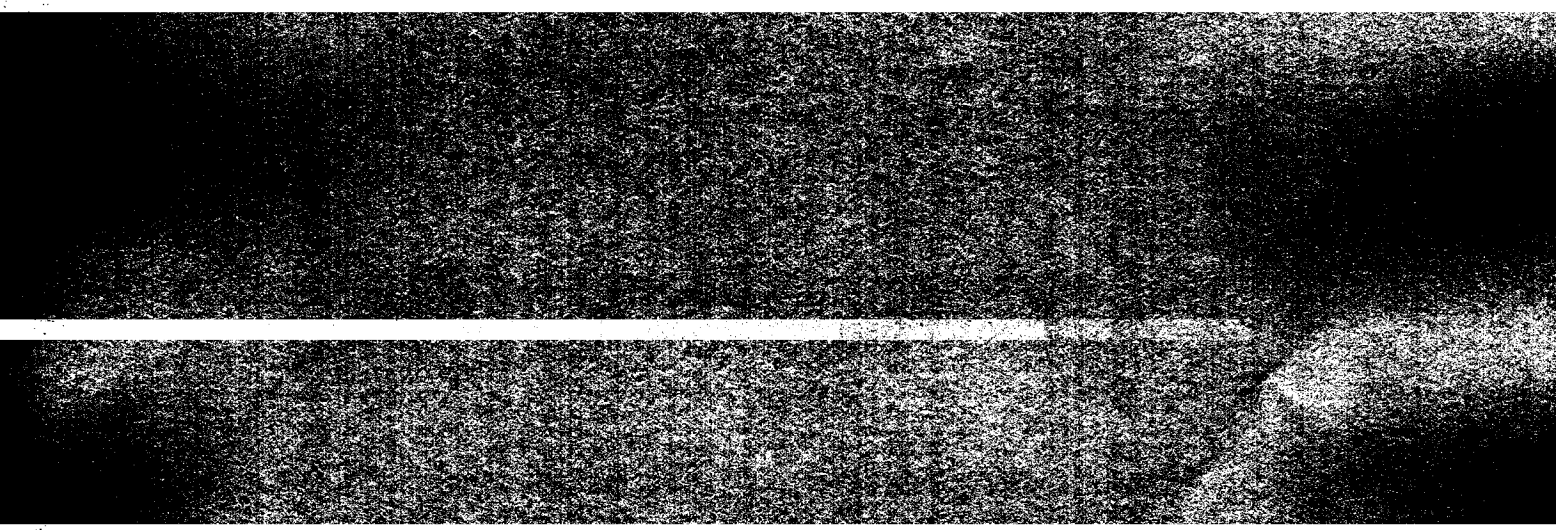
1.3.5 TELETEXT DATA SLICER SDA 5231

The SDA 5231 data slicer is used in the teletext decoding section to seperate the teletext data signal from the CVBS signal. Information consists of eight bits, where the most significant bit is a parity bit, followed by seven data bits. The teletext signal amplitude is reduced to 50 percent of it's incoming value by the SDA 5231 to reduce the possibility of interference from other sources. A phase shifting circuit together with a crystal oscillator regenerate the data synchronous clock. So clock and data signal can be supplied to the teletext decoder device.
A synchronous separator generates line and field sync pulses. The line sync signal is used to control an on-chip 6MHz oscillator which passes on the clock signal to the teletext decoder.

After attaing line frequency (15,625kHz), the signal is transmitted to the slicer. Here a phase comparator synchronizes the, 5.5MHz oscillator rigidly to the video signal so that, if video signal quality is sufficient, fading in a text into a TV picture (e.g.subtitles) is possible synchronous to CVBS signal.
The SDA 5231 is manufactured in bipolar technology and housed in a DIP 28 case.

1.3.6 THE TELETEXT PROCESSOR SDA 5243

The teletext processor SDA 5243 and IIC bus controlled devices to process all funtions which are necessary to use the teletext service of broadcasters, only in 6 foreign languages as English, German, French, Türkish, Spanish, Italien.
Serial teletext data is received from the SDA 5231 data slicer. Four independent acquisition circuits are responsible for selecting the requested data. After acquisition the data is loaded via a memory interface to an external RAM. Each received page occupies 1kByte of ram (2kByte if ghost rows are received).
The external RAM is read out cyclically and the data is processed in a character generator into R-, G-, B- information. Further a blanking signal, a contrast reduction signal and a Y-signal to control a black and white monitor are generated. Via the IIC bus interface 12 registers can be loaded by the microcontroller and one register can be read and written too.
The SDA 5243 is mounted in a 40 pin DIP case.



DISASSEMBLY INSTRUCTONS
(See also Exploded Views)

BACK COVER REMOVAL
(For 20"-21" Models)
1. Remove 2 csrews at the bottom of the back cover
2. Push in 4 side locks by pushing with a screw driver and pull back the cover carefully. Taking care not to pull the speaker cable.
3. Disconnect the speaker cable from the chassis and take out the power cord from the cable way at the bottom of the back cover. Figure 1

(FOR 14" - 15" Models)
1. Remove 4 screws holding the back cover.
2. Remove the screw fixing the power cord holder to the back cover.
3. Pull back the cover carefully, taking care not to pull the speaker cable.
4. Disconnect the speakercable form the chassis.

NOTE!
When reassembling the back cover, take care to slide the main chassis board into the guideways located on the back cover on both sides. Figure 2

SPEAKER ASSEMBLY REMOVAL (For 20"-21" Models)
1. Remove the 2 csrews fixing the speaker assembly to the back cover.
2. Release the four locks and push the assembly out.
3. Remove the 4 screws holding the speakers on the speaker assembly. Figure 4

SPEAKER REASSEMBLY (For 14"-15" Models)
1. Place the speaker on the speaker assembly; the speaker terminals should be placed towards the front of the TV set.
2. Slide the locks on the assembly through the holes of the back cover until hearing a "click" sound which means that the assembly has fitted in place.
3. Attach the screws (2 pcs) fixing the speaker assembly to the back cover. Figure 3

MAIN CHASSIS REMOVAL (FOR 20"-21" Models)
1. Open two guide locks on both sides of the chassis and pull the chassis out.
2. Take the cables, connected to the power switch, out from the chassis frame.
3. Pull the chassis back carefully.

(For 14"-15" Models)

1. Pull the chassis back carefully.

CPT REMOVAL
1. Disconnect power (ST01, 02), degaussing (ST101) and control unit cables (ST03,04) from the chassis.
2. Discharge the tube and disconnect the E.H.T. cap as told in Safety Instructions.
3. Disconnect the tube earthing cable coming from the CPT board.
4. Disconnect the ST802 connector on the chassis, and cable ties holding the cables of ST802 and ST801.
5. Disconnect the CPT board from the neck of the tube, taking care not to damage the tube pins.
6. Place the front cover on soft material so as not to mar the front surface or damage the controls.
7. Remove 4 screws securing the picture tube brackets to the front cover.
8. Carefully separate the CPT from the front cover.

CAUTION
Great care must be taken when handling the picture tube.

Always lift the picture tube by holding it firmly arround the face plate. DO NOT LIFT THE BY ITS NECK.
The picture tube must not be scratched or subjected to excessive pressure.

NICAM MODULE

BRIEF DISCRIPTION OF SAA 7280

The SAA 7280 is a CMOS integrated circuit that fully conforms to the EBU NICAM 728 specification. This device takes as input a NICAM 728 encoded signal data stream from the DQPSK demodulator, then performs the descrambling, de-interleaving and reformatting functions required to recover the original sound samples. The SAA 7280 contains an I²C bus transceiver enabling microcomputer control of the IC, and has automatic decoding and output configuration depending upon transmission:

— digital stereo
— digital mono+data
— two independent mono signals

Other features include: on board RAM for de-interleaving and 10 to 14 bit word expansion, 7 sample interpolator for erroneous samples, selectable 3x digital oversampling filter, and I²S sound bus output format. The on-chip 3x oversampling filter reduces the components needed for external analogue filtering.

D/A conversion - TDA 1543

The TDA 1543 is a monolithic integrated dual 16-bit digital-to-analogue converter (DAC), which was originally developed for compact disk players. It combines ease and economy of application with good digital audio performance levels. The TDA 1543 takes in digital sound data in I²S format from the decoder and provides analogue left and right channel audio outputs. There is no requirement for external deglitcher circuitry due to fast settling output current, and few external components are required. A resistor, is used to set an output current bias to optimally bias the output operational amplifiers.

AUDIO OUTPUT STAGE

The audio output stage converts the current source outputs of theTDA 1543 DAC into an audio output voltage on connectors X2 and X3 for power amplification. The output stage performs the following two functions:

— De-emphasis according to J-17 recommendation.
— Low pass filtering to remove sampling images from the 3X oversampling digital filter.

Two dual operational amplifiers (NE 5532) are included (one for each channel) on the application board to perform the above functions. One of the amplifiers in each package is used to perform the de-emphasis and first order low pass filtering. The second amplifier is used to realise a Sallen and Key 2nd order low pass filter. The overall response is a 3rd order Chebyshev low pass filter with a ripple bandwidth of 15KHz (ripple 0.25dB).

FM-MONO I-STANDARD

TV-Transmitter-Mode	Display on Screen	Remote Control
mono		
all modes	Mono	AF-Mode (force mono)

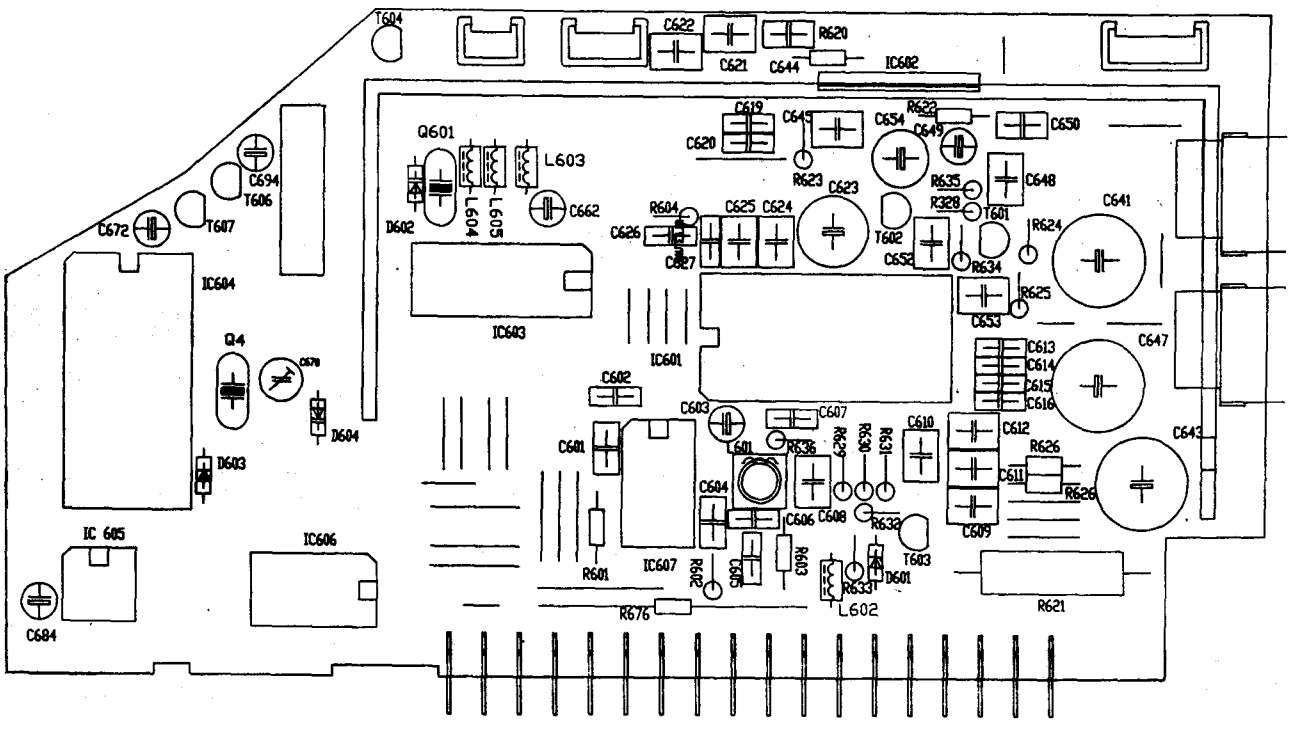
NICAM I-STANDARD

TV-Transmitter-Mode	Display on Screen	Remote Control
Mono	NICAM	
dual	NICAM Dual A NICAM Dual B	AF - Mode
stereo	NICAM Stereo	
all modes	Mono	AF - Mode (*) (force mono)

(*) In the mode force-mono the status NICAM is changing to FM-Sound and the display on screen NICAM will flash.

When the FM-Signal is not carrying the same sound program as the NICAM stereo or mono signal the display on screen is (NICAM) and the FM-Sound is priority.

NICAM MODULE PATTERN DRAWING

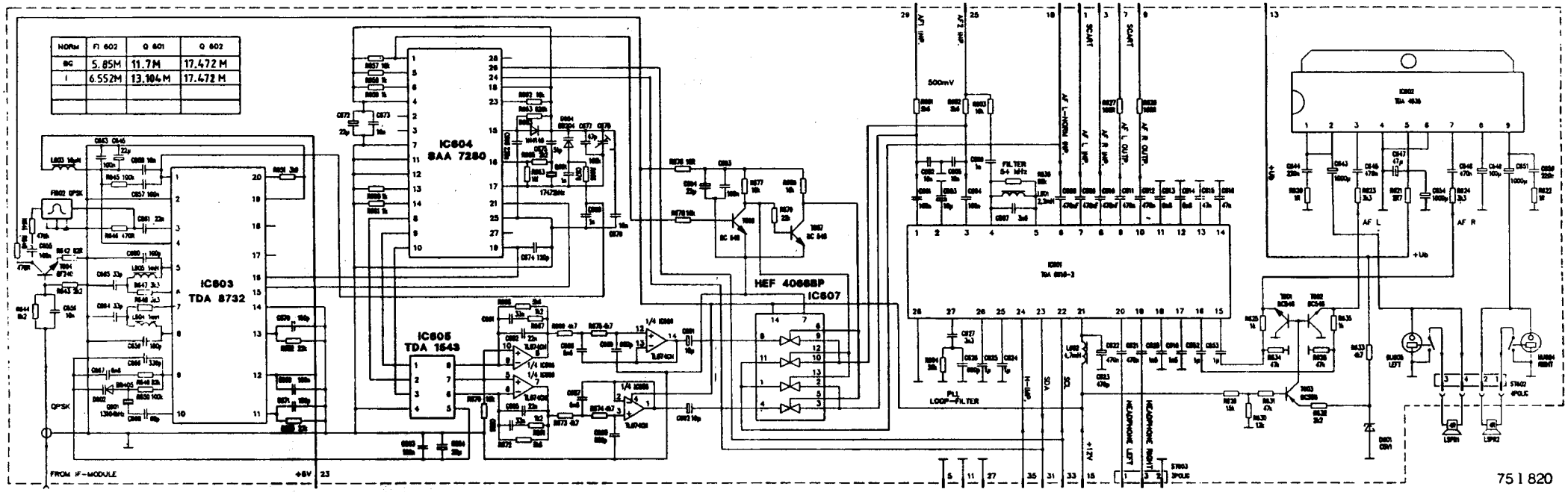


STEREO AF AND NICAM MODULE WITH POWER AMPLIFIER

(Not used when stereo AF module with Decoder is available)

NICAM - DECODER

STEREO - DECODER AND POWER AMPLIFIER



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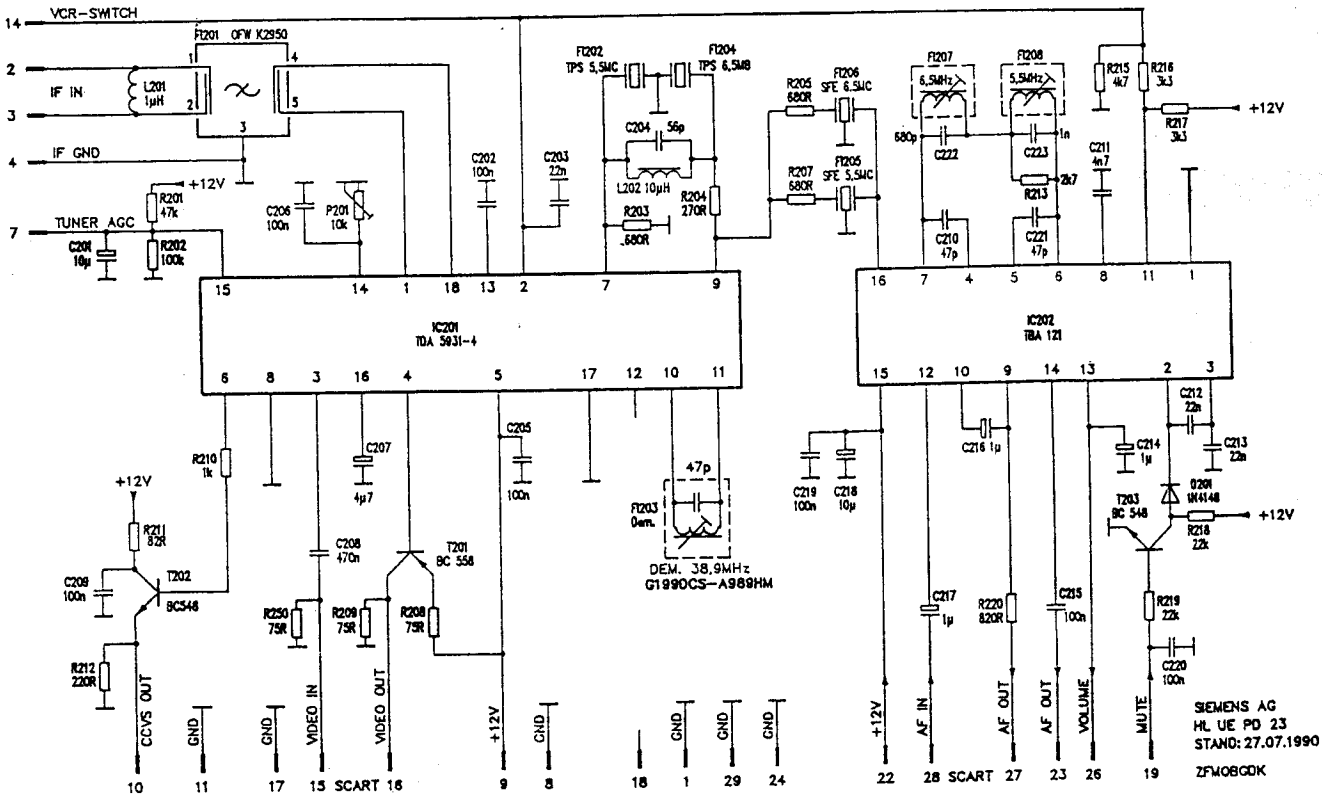
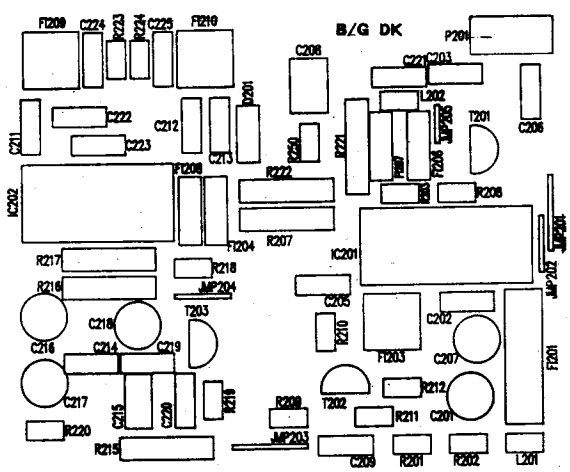
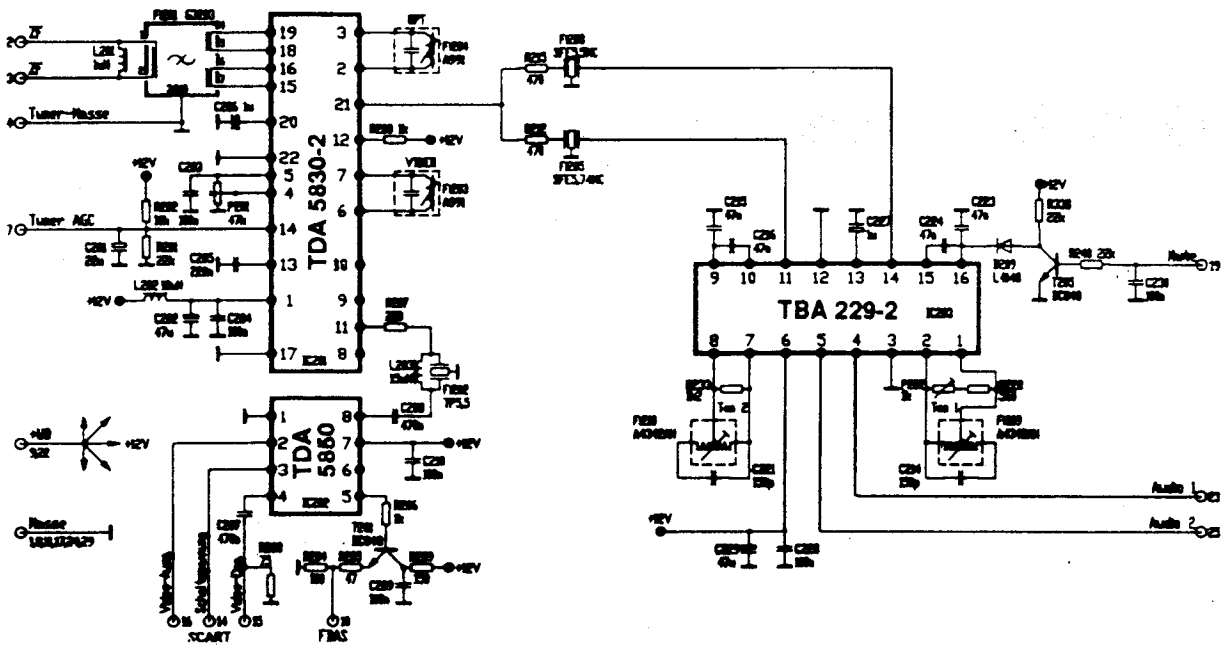
MONO IF MODULE BG/DK



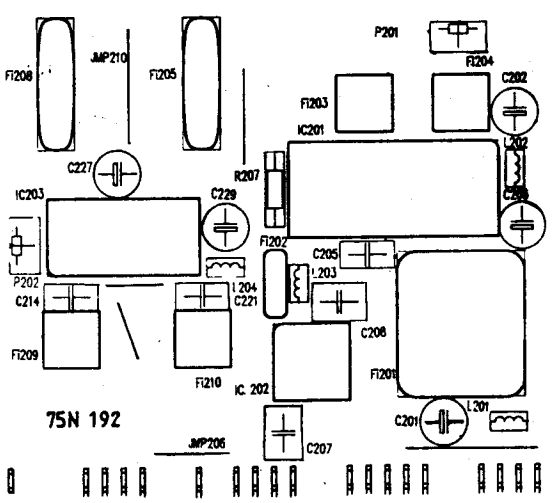
MONO IF MODULE PATTERN DRAWING



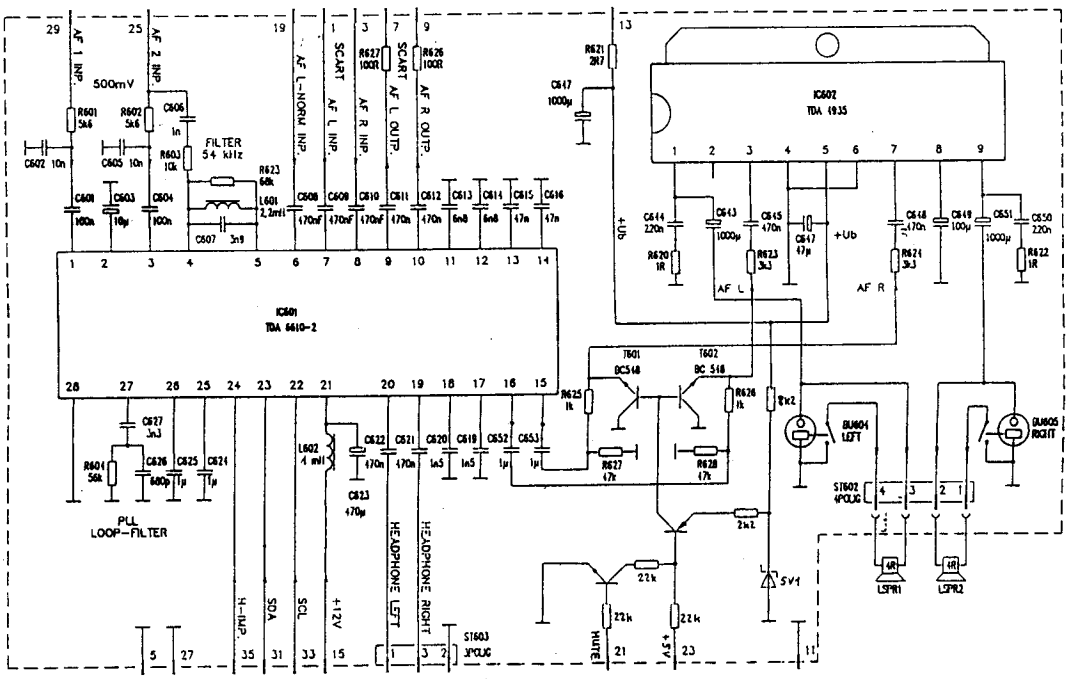
STEREO IF MODULE

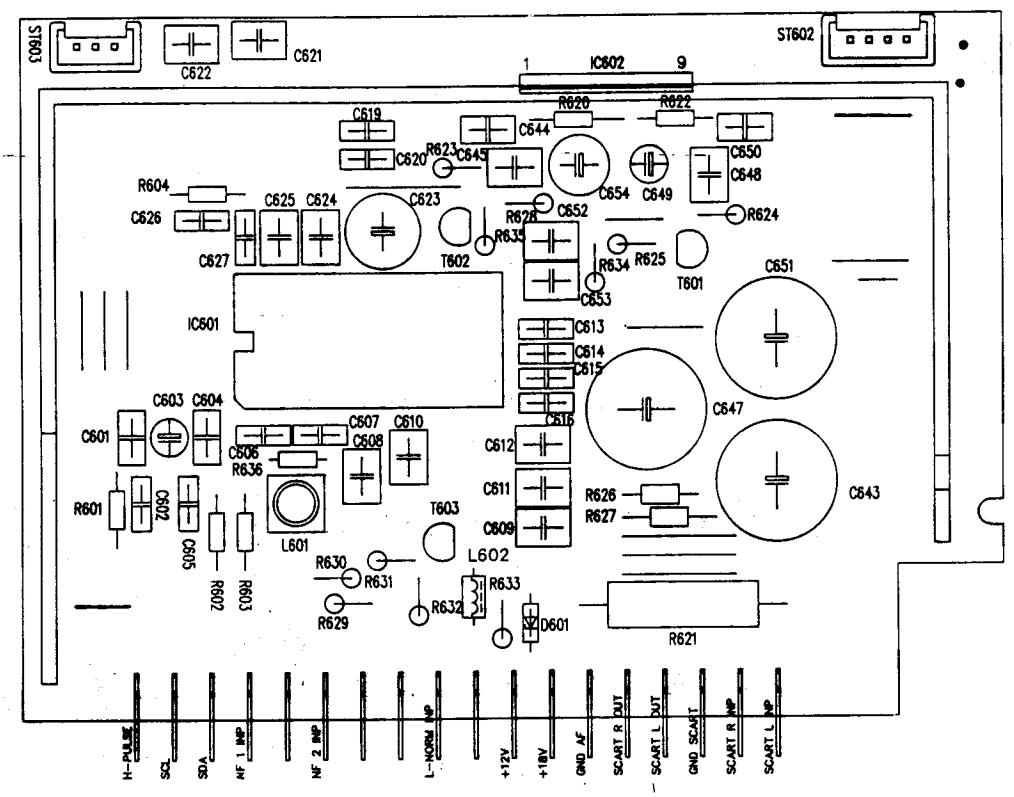


STEREO IF MODULE
PATTERN DRAWING



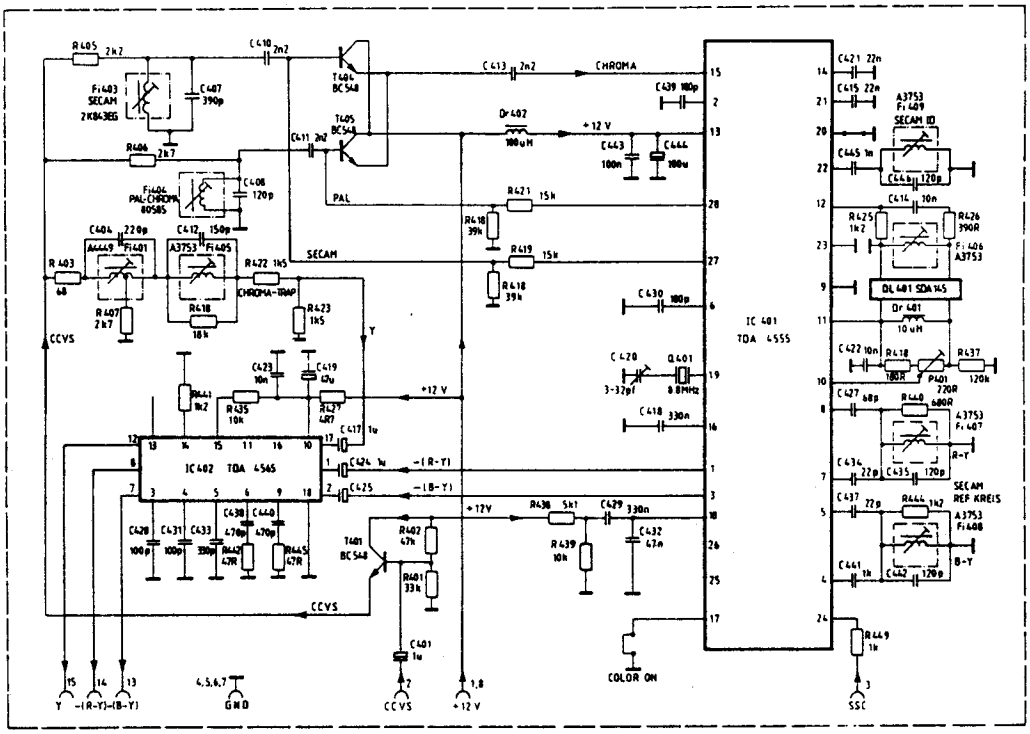
STEREO AF MODULE WITH DECODER AND POWER AMPLIFIER



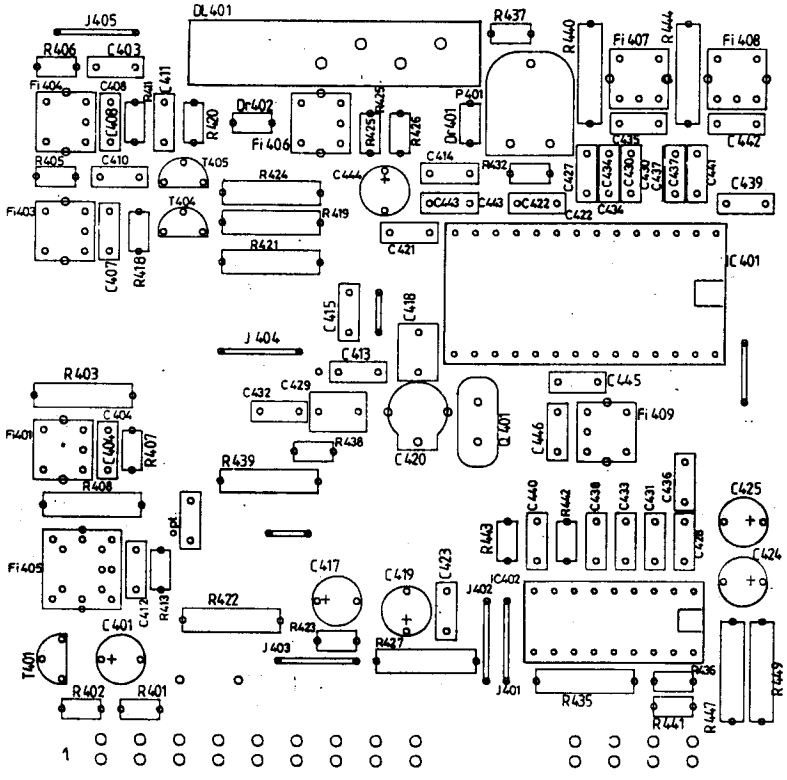


STEREO DECODER PATTERN DRAWING

PAL/SECAM DECODER WITH CTI

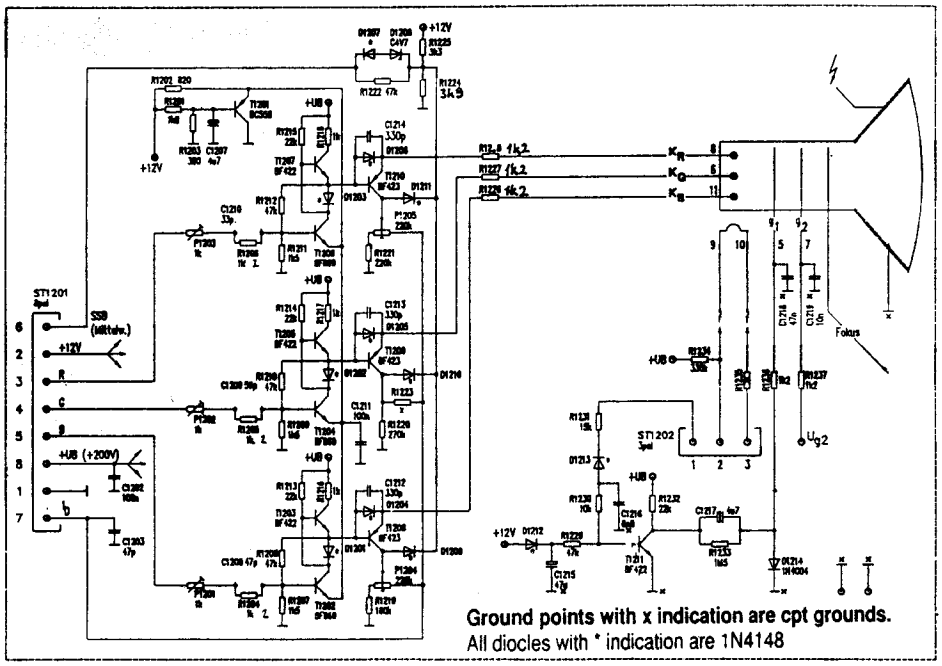


PAL/SECAM MODULE PATTERN DRAWING



PAL/SECAM

CRT MODULE



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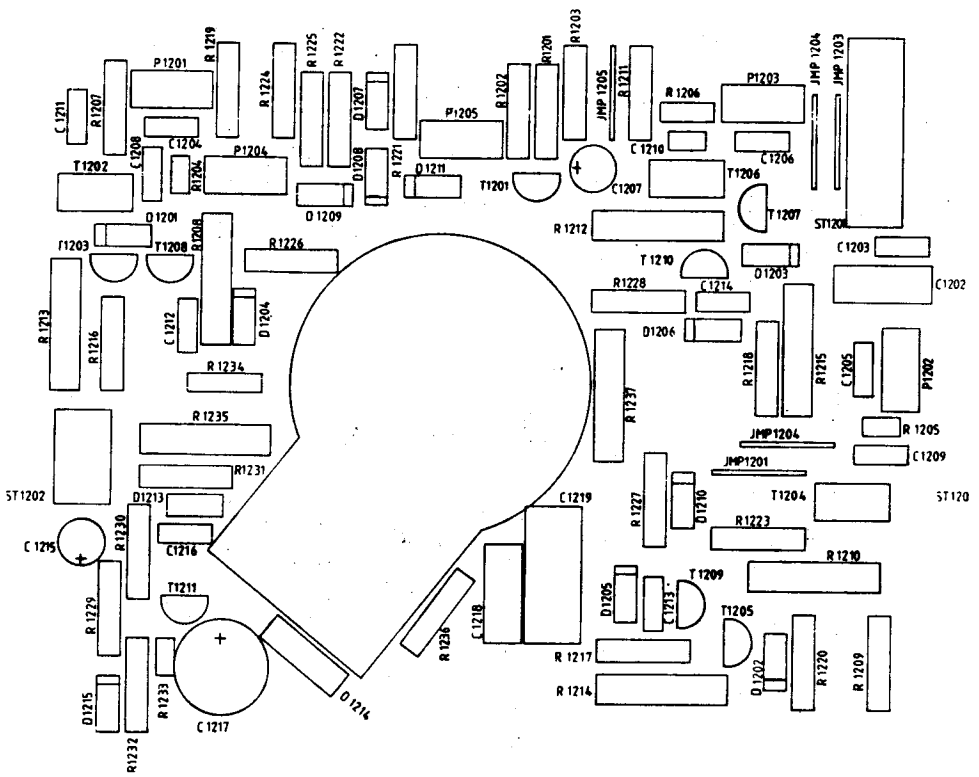
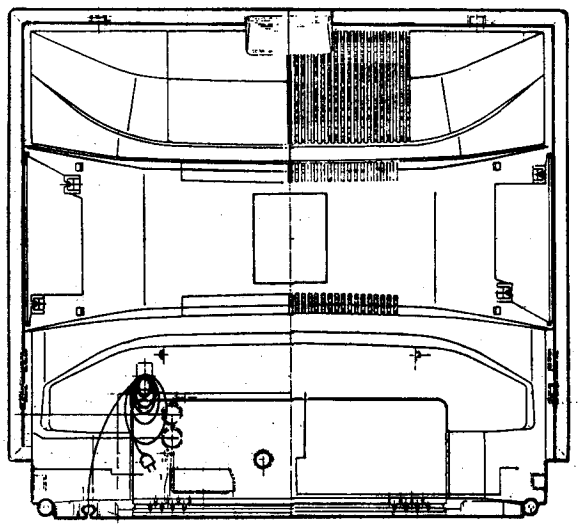
CRT MODULE PATTERN DRAWING



DISASSEMBLY INTRUCTIONS

20"-21" Models



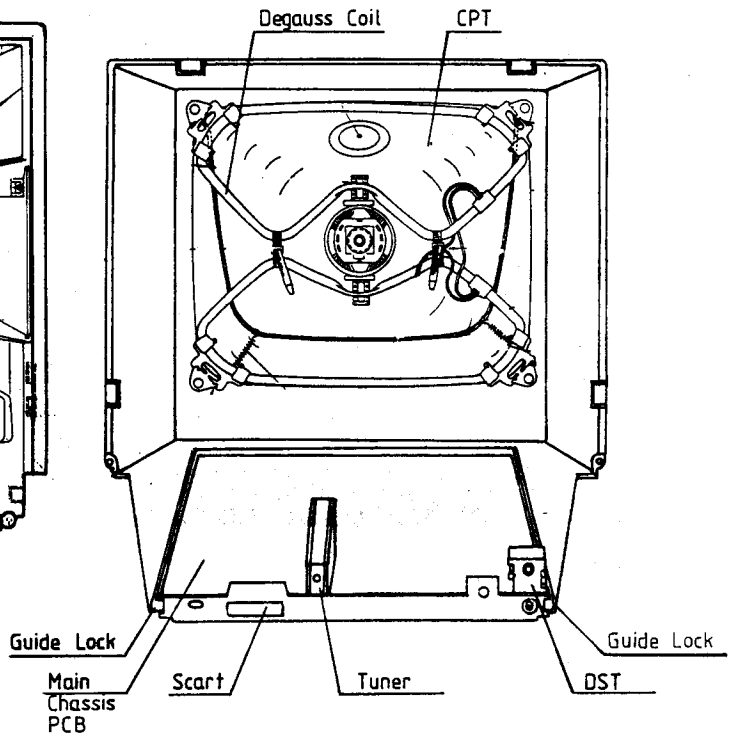
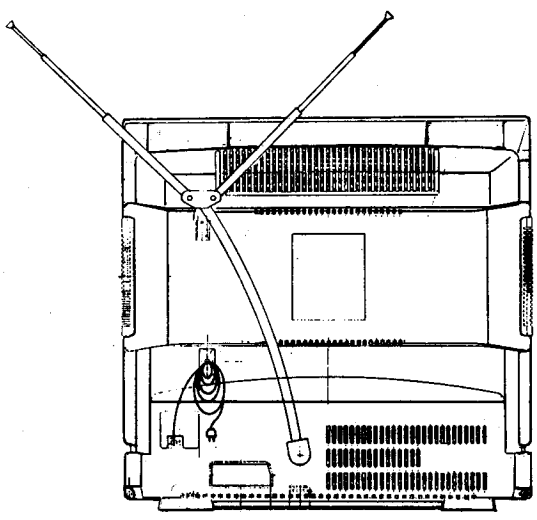


Figure 1

14"-15" Models



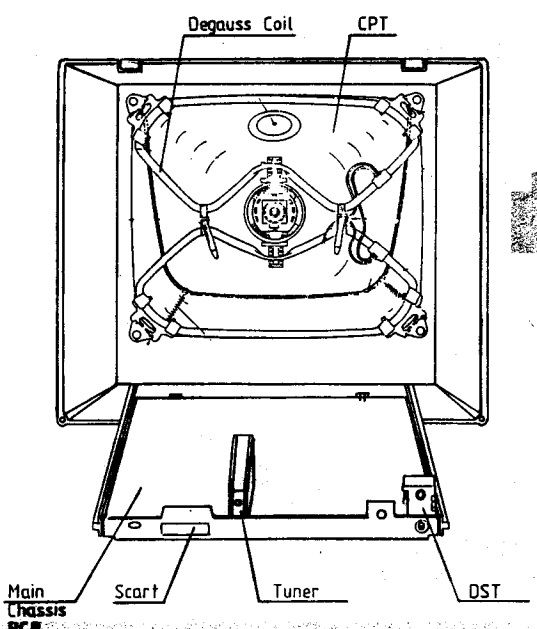


Figure 2

SERVICE ADJUSTMENTS

INTERMEDIATE FREQUENCY BOARD ADJUSTMENT AND CONTROL:

1— Apply 12V DC to 9th and 22nd pins of IF board.

2— Apply 38.5 MHz signal modulated with video signal (step or 2T) and 1kHz sound signal to 2nd or 3rd pins of IF board.

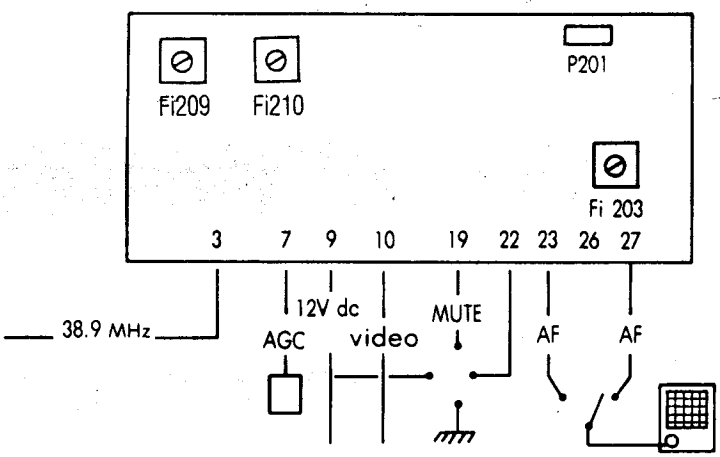
3— After connecting 7th pin of IF board to a voltmeter, see the AGC output change between 0 and 7.5V by adjusting P201 clockwise or counter clockwise. Leave it at its maximum level.

4— Adjust F 1203 until obtaining the wave form in Figure 8.
— Apply a voltage of changing between 0.3V and 4.6V DC to 26th pin o the IF board and see the. wave shape in Figure 8 from the 27 th pin of the board.

5— After grounding 19th pin of the board, see the muting on oscilloscope.

6— Apply 38.9 MHz signal modulated with video signal and 1kHz (6.5 MHz carrier) to pin 3. Adjust Fi209 for optinum waveform on pin 23 or 27 (standard D/K)

7— Apply 38.9 MHz signal modulated with video signal and 1kHz (5.5 MHz carrier) to pin 3. Adjust Fi210 for optimum waveform on pin 23 or 27. (Standard B/G)



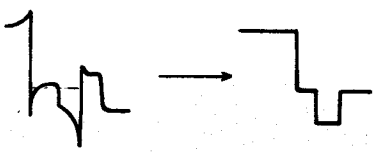


Figure 8

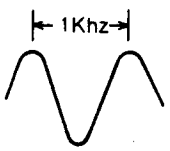


Figure 9

SUPPLY VOLTAGE ADJUSTMENT:

1— While all controls are set to minimum, P101 is adjusted, so that the voltage difference between ground and R805 or D109 is 125 V DC+1V. (148 VDC + 1V for 110° Sets)

2— After P501 is adjusted to medium position, screen potentiometer on DST is adjusted until snowy picture is just obtained. Depress the NORMAL button on the Remote Control to optain the average contrast, brightness and colour settings.

3— Using a Philips pattern generator or other suitable signal, adjust P701 (horizontal adjustment) and P703 (vertical adjustment) to correctly position the picture. Adjust vertical amplitude with P702 and horizontal amplitude with L901.

AGC ADJUSTMENT:

Input a color test pattern, the signal input voltage should be 1.5mV=64 dBuV+2dBuV, AGC voltage is observed. While adjusting P201 on IF board by rotating it clockwise, see the increase in DC level. After obtaining maximum DC value approximately at 8V, adjust P201 until DC level drops IV and becomes approximately 7Vdc.

SCREEN ADJUSTMENT:

All potentiometers, on CRT PCB are adjusted to their medium positions. Additionally P501 on main board must also be at medium position. Contrast, Brightness and screen potentiometer are set to minimum.
AV position is selected on TV.
The oscilloscope is connected to the highest test points (either 154, 155 or 156) on CRT.
P501 is adjusted till the wave shape in Figure 5 is obtained.
Screen potentiometer is adjusted, so that the "X" lenght is 135V (158 Vdc for 110° chassis) and check the same shape for other test points too. Figure 10

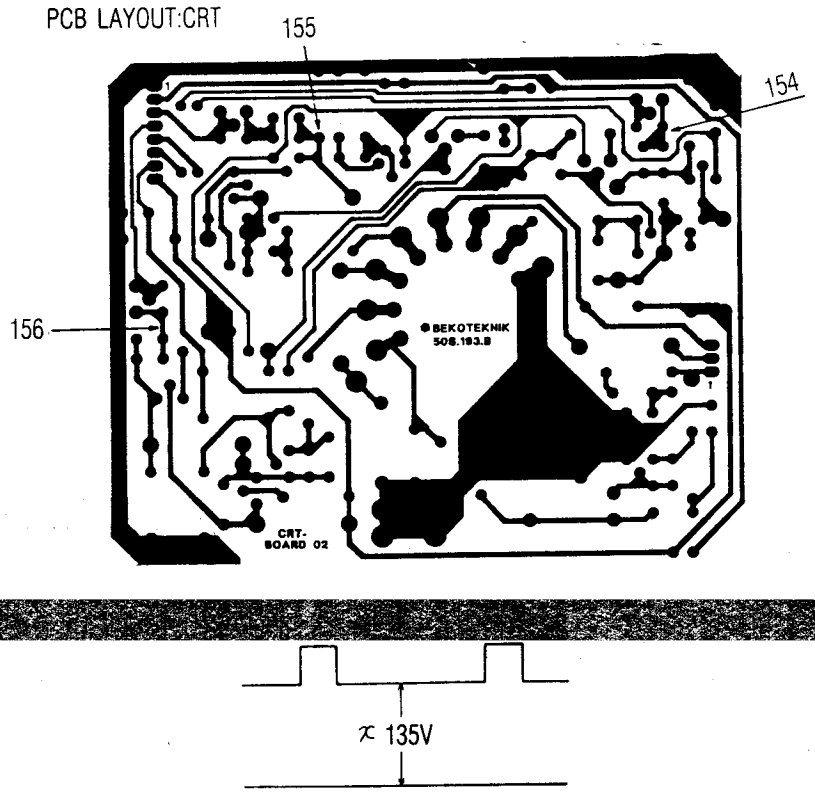


Figure 10

WHITE BALANCE ADJUSTMENT

a) HIGH LUMINANCE ADJUSTMENT

After selecting "White Pattern" colour minimized. Adjust the brightness and contrast to obtain a bright picture Y=60 ±5 nits (witch Minolta Colour Analyser) which corresponds % 80 of max. luminance level. P1203 (Red)), P1202 (Green) and P1201 (Blue) are adjusted to obtain best white level and coordinates which corresponds to 8600 deg K.

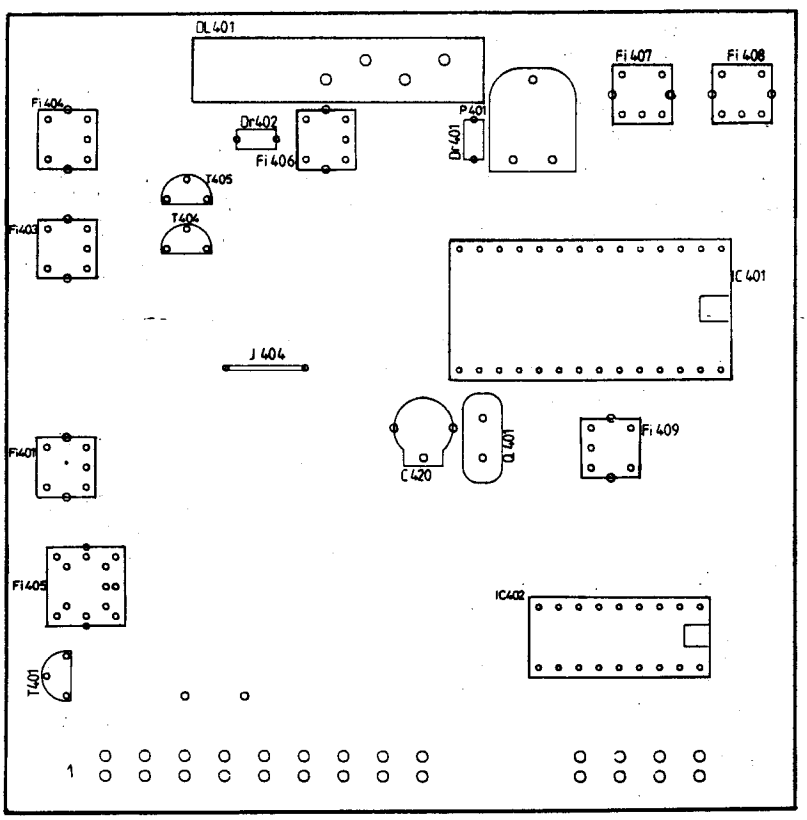
b) LOW LUMINANCE ADJUSTMENT

Adjust the brightness and contrast to obtain Y=8 ± 3 nits a dark picture which corresponds appr. % 20 of max. luminance level, for low level white balance. P1205 (Red) and P1204 (Blue) are adjusted to obtain best white level which corresponds to 8600 deg. K.

8600 deg K =>X =287, Y=308

High and low level white balance adjustments have to be repeated once more, because of the inter action of high and low level white balance adjustments.

PAL/SECAM BOARD ADJUSTMENT AND CONTROL



PAL ADJUSTMENT:

1— FBAS-Color Bar signal-is applied to 2nd pin of the board.

2— While the signal on the emitter of T405 is observed on the oscilloscope, color carrier is adjusted to its maximum value with Fi404.

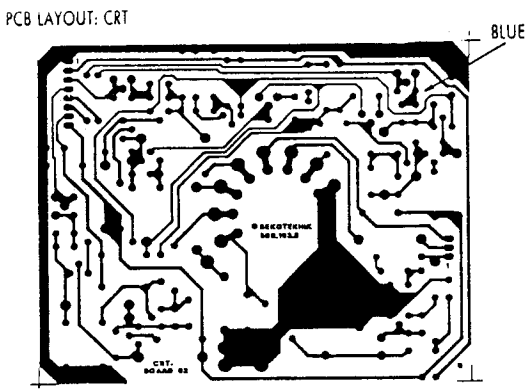
REFERENCE OSCILLATOR ADJUSTMENT:

1- - The 17th pin of the TDA4555 is grounded.

2— Color flow on screen is minimized with C420.

LUMINANCE ADJUSTMENT

1— Color carrier or 15th pin of the board is minimized with Fi401.



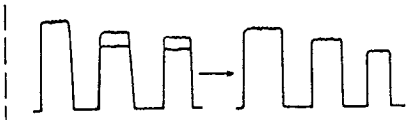


Figure 11

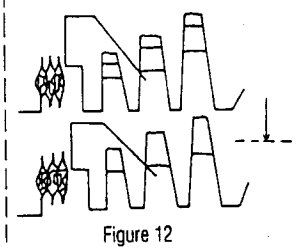


Figure 12

PAL ADJUSTMENT:

1— Oscilloscope probe is connected to the end of "Blue" Potantiometer which is connected to R1204. And Fi 406 is adjusted as seen in Figure 11.

2— Philips DEM test signal is applied to the 2nd pin.

3— The gaps at speaks are adjusted so that they inserted as shown in Figure 12. Then check with 4.43 MHz section on Philips DEM pattern.

SECAM ADJUSTMENT:

CHROMA ADJUSTMENT:

1— Color bar signal is applied to the second pin at the board

2— The signal at the emitter of T404 is observed on oscilloscope. The peaks are adjusted with F1403-Bell filter-as shown in Figure 13.

SECAM IDENTIFICATION ADJUSTMENT

1— A multimeter with high internal resistance (10M) is connected between 21st pin of TDA4555 and ground.

2— The potential difference is adjusted to its maximum value with F1409.

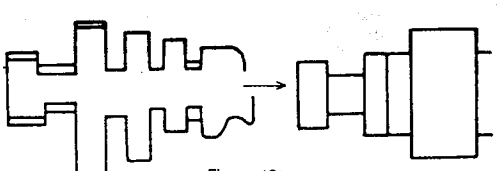


Figure 13

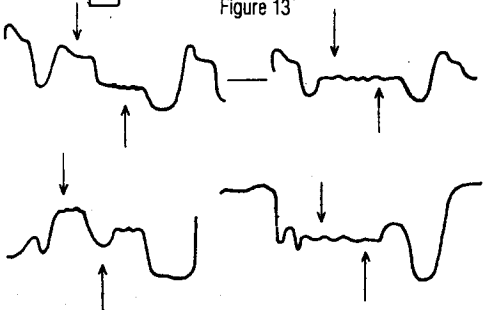


Figure 14

SECAM COLOR TRAP ADJUSTMENT:

1— Y Signal is observed from 15th pin of the board and color carrier signal is adjusted to its minimum level with F1405.

SECAM DISCRIMINATOR ADJUSTMENT:

1— The (R-Y) and (B-Y) signals are observed from teh 14th and 15th pin of teh board.

2— The signals which are indicated with arrows in Figure 14 are adjusted so that they come to same level.

CONVERGENCE ADJUSTMENTS

Note: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

• Centre Convergence Adjustment

1. Receive crosshatch pattern with a colour bar signal generator.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 16.) and superimpose red and blue vertical lines in the centrel area of the picture screen. (See figure 17.)
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizontal lines at the centre of the screen. (See figure 17.)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3,4,5 to ensure best convergence, the adjustment must be undertaken with great care because of the interaction between 4 and 6 pole magnets.

• Circumference Convergence Adjustment

1. Loosen the clamping screw of deflection yoke to allow the yoke to tilt.
2. Put a wedge as shown in figure 15 temporarily. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See figure 17.) Push the mounted wedge into the space between picture tube and the yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure 17.)
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick 3 adhesive tapes on wedges.

CONVERGENCE COMPENSATOR

Compensators L462A and L462B are used to correct misconvergence (Red-Green) at the top center or bottom center on screen, when the misconvergence is still evident even though the yoke adjustment is tried. Compensatör L462C is also used to correct misconvergence (Vertical shift of Red or Blue) at four corners on screen.

1. To correct horizontal misconvergence (Red-Green), put compensator L462A on the yoke back (see figure right) to find a position for minimizing misconvergence. Mark the position and remove protective paper on the rear of L462A to stick it in place. Apply adhesives on both of yoke and L462A.
2. To correct vertical misconergence (Red-Green), put the tips of compensator L462B into either of holes on the yoke core and apply adhesives.
3. To correct up or down shift of Red at top right or bottom right corner, put compensator L462C at the point 1 or 2 on the picture tube (see figure right.) to find a position for minimizing misconvergence. Mark the position and remove protective paper on the rear of L462C to stick it in place.

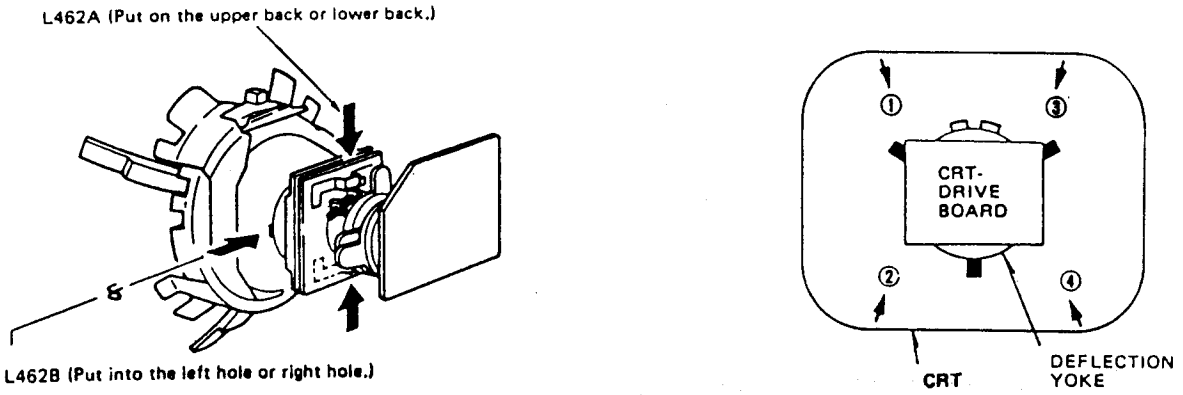


Figure 15.

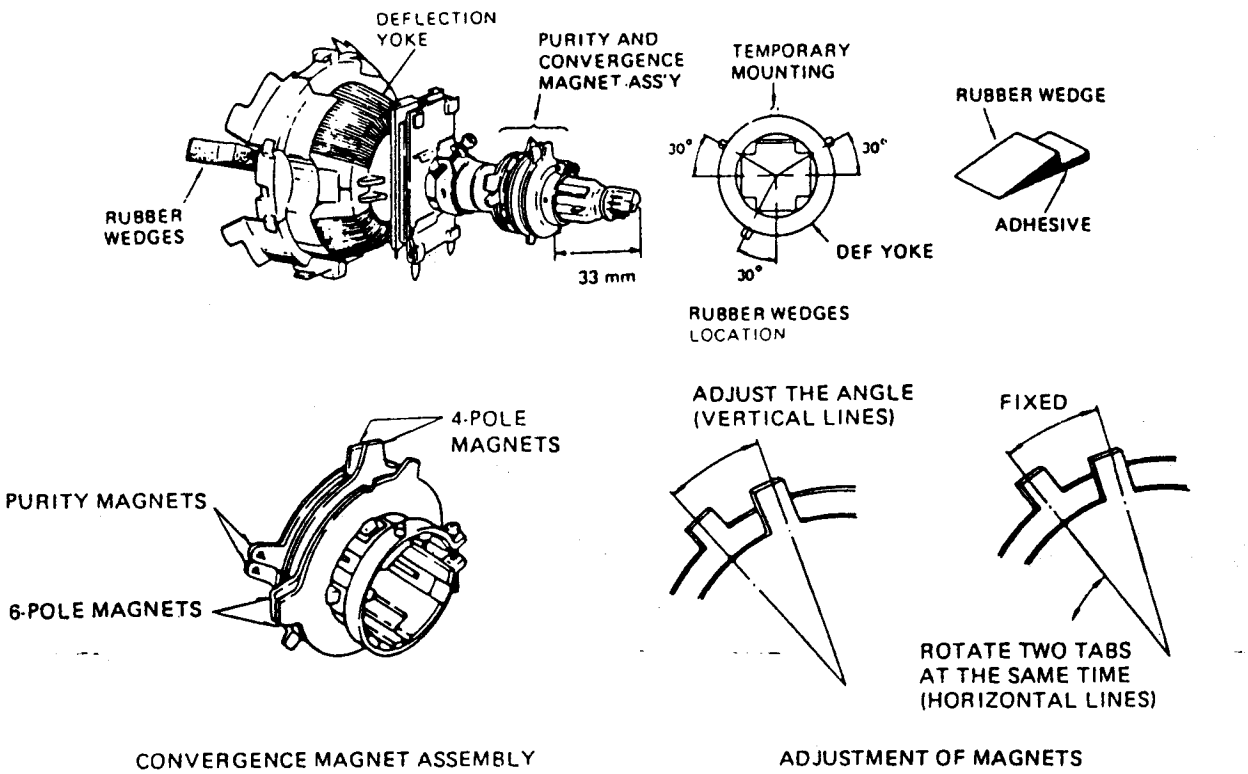
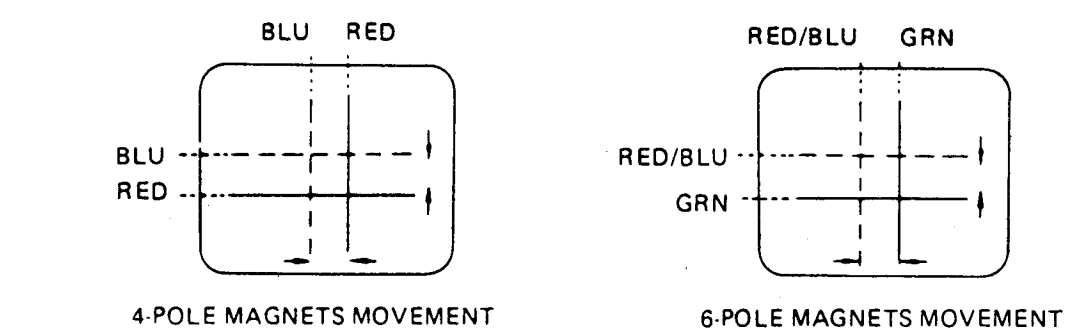
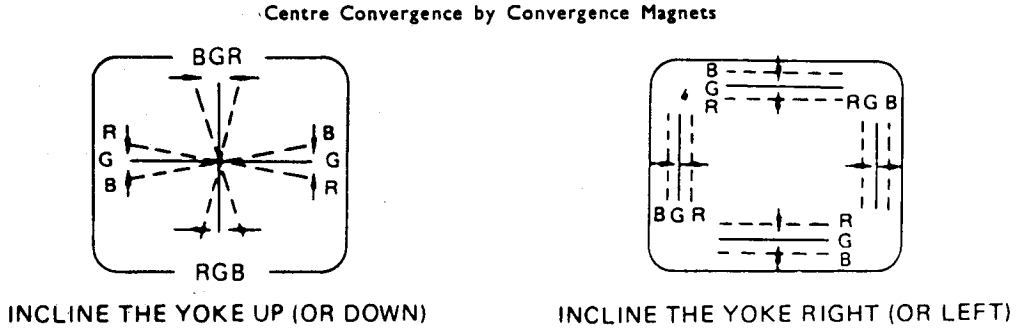


Figure 16.



Centre Convergence by Convergence Magnets



Circumference Convergence by DEF Yoke

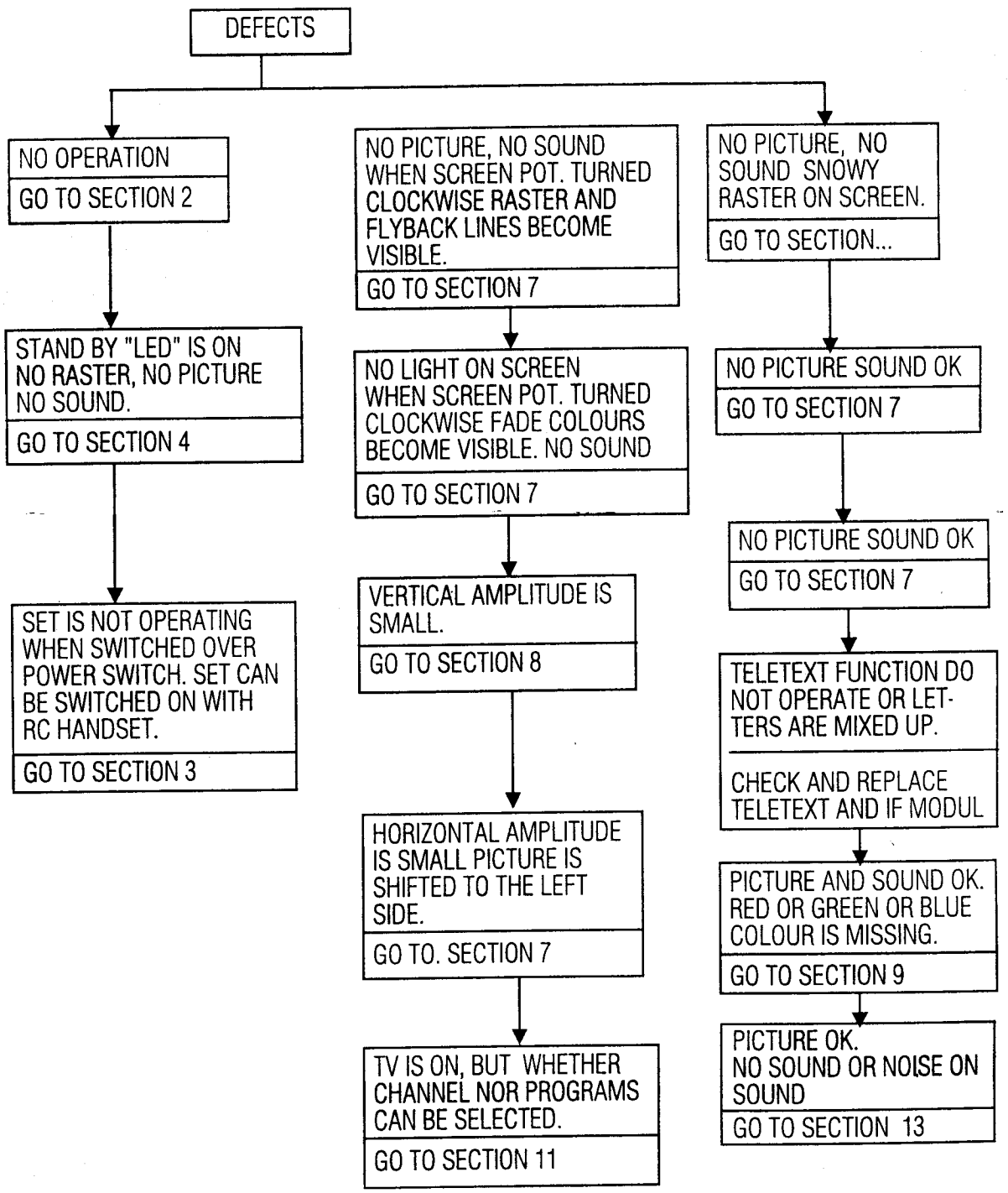
Figure 17. Dot Movement Pattern

CHSASIS / SCREEN SIZES / CPT MANUFACTURES	14"	15"	20"	21"	25"	28"
GOLDSTAR	A34 KCQ 12XX01 (T) 370 HUB 22-TC01		A48 KCS 12XX27	A51 KAK 12XX05 (T)		
SAMSUNG	37 GGA 85X-TC01 3708B		A51 GGD95X-TC	54 HGB 99X-TC		
ORION	A343 LL70X23	A36 JSW 90X01	A48 ELL 90X01 (T)			
HITACHI		A36 JUF60X06	A48 JSK61X01 (T)	A51 JFC 61X13		
TOSHIBA		A36 JAR 40X03 (T)		A51 JRU 40X01 (T)		
PHILIPS		A36 EAM 00X01 (T)		A51 EAL 06X01		
VIDEOCOLOR				A51 EBV 13XX01	A59 ECY 13X38 R1235: 1 OHM, 1W L810: 90 uH	A66 ECY 13X38 R1235 : 1 OHM, 1W L810 : 70 uH
NOKIA				A51 ECQ 00X01	A59 ECF 10X05 R1235:2.2 OHM, 1W.	A66 ECF 10X05 R1235:2.2 OHM, 1W
WF			A48 ECR 11X01			

R1235 IS FOR ALL CRT's with 90° DEFLECTION ANGLE IS 0.1 OHM FUSEABLE TYPE RESISTOR.

① TROUBLE SHOOTING

1 -TROUBLE SHOOTING GUIDE
2 -GENERAL POWER SUPPLY DEFECTS
3 -POWER I-POWER SUPPLY DEFECTS
4 -POWER II-POWER SUPPLY DEFECTS
5 -SWITCH MODE TRANSFORMER DEFECTS
6 -PROTECTION CIRCUIT DEFECTS
7 -DEFECTS RELATED TO DARK SCREEN
8 -DEFLECTION CIRCUIT DEFECTS
9 -TEA 2029 AND PERIPHERIAL DEFECTS
10 -COLOUR DECODER DEFECTS
11 -CRT DRIVE BOARD AND IC501 DEFECTS
12 -MICROPROCESSOR DEFECTS
13 -SOUND CIRCUIT DEFECTS


DEFECTS
NO OPERATION
GO TO SECTION 2
STAND BY "LED" IS ON NO RASTER, NO PICTURE NO SOUND.
GO TO SECTION 4
SET IS NOT OPERATING WHEN SWITCHED OVER POWER SWITCH. SET CAN BE SWITCHED ON WITH RC HANDSET.
GO TO SECTION 3
NO PICTURE, NO SOUND WHEN SCREEN POT. TURNED CLOCKWISE RASTER AND FLYBACK LINES BECOME VISIBLE.
GO TO SECTION 7
NO LIGHT ON SCREEN WHEN SCREEN POT. TURNED CLOCKWISE FADE COLOURS BECOME VISIBLE. NO SOUND
GO TO SECTION 7
VERTICAL AMPLITUDE IS SMALL.
GO TO SECTION 8
HORIZONTAL AMPLITUDE IS SMALL PICTURE IS SHIFTED TO THE LEFT SIDE.
GO TO. SECTION 7
TV IS ON, BUT WHETHER CHANNEL NOR PROGRAMS CAN BE SELECTED.
GO TO SECTION 11
NO PICTURE, NO SOUND SNOWY RASTER ON SCREEN.
GO TO SECTION...
NO PICTURE SOUND OK
GO TO SECTION 7
NO PICTURE SOUND OK
GO TO SECTION 7
TELETEXT FUNCTION DO NOT OPERATE OR LET-TERS ARE MIXED UP.
CHECK AND REPLACE TELETEXT AND IF MODUL
PICTURE AND SOUND OK. RED OR GREEN OR BLUE COLOUR IS MISSING.
GO TO SECTION 9
PICTURE OK. NO SOUND OR NOISE ON SOUND
GO TO SECTION 13

NOTE: ALL ANALOG CONTROL (LUMINANCE, CONTRAST, COLOUR, VOLUME), SHOULD BE AT MEDIUM LEVEL.

EXPLODED VIEW

(14"-15" MODELS)

NO	PART NO	DESCRIPTION	QTY
38	056.060	CPT, 15"	1
37	056.737	CPT, 14"	1
36	64A.214	CHASSIS FRONT BRACKET-2	1
35	64A.213	CHASSIS FRONT BRACKET	1
34	033.929	SHIELD WIRE	1
33	011.360	SCREW 3.9x13	2
32	50V.188	TELETEXT MODULE	1
31	54K.208	HOLDER TELETEXT	1
30	54G.203	HOLDER, TX ASSY	2
29	011.614	SCREW 2.9x9.5	2
28	833.215	POWER CORD HANGER	1
27	60U.903	RUBBER CONTACT	1
26	60U.207	PLATE FUNCTION	1
25	011.956	SCREW 3.9x13	1
24	64A.204	POWER CORD HANGER	1
23	60U.203	LENS LED	1
22	51A.301	SPRING POWER KNOB	1
21	64A.211	PLATE REMOTE CONTROL	1
20	60U.206	PLATE FUNCTION I	1
19	60U.210	PLATE FUNCTION II	1
18	60U.212	DECO PANEL	2
17	64A.206	CONTROL UNIT DOOR	1
16	60U.202	LED COVER	1
15	60U.208	POWER KNOB	1
14	64A.202	PANEL	2
13	60U.902	RUBBER CONTACT-II	1
12	60U.901	RUBBER CONTACT-I	1
11	011.814	SCREW	5
10	64A.172	CONTROL UNIT	1
9	".110	CHASSIS PCB	1
8	505.220	CHASSIS BRACKET	1
7	011.507	SCREW CPT (EJOT)	4
6	011.507	SCREW CPT (EJOT)	4
5	710.107	SPEAKER	1
4	011.950	SCREW 3.9x13	4
3	64A.203	HOLDER, BACK COVER	1
2	64A.205	BACK COVER	1
1	65A.201/64A.201	FRONT FRAME 15"/14"	1

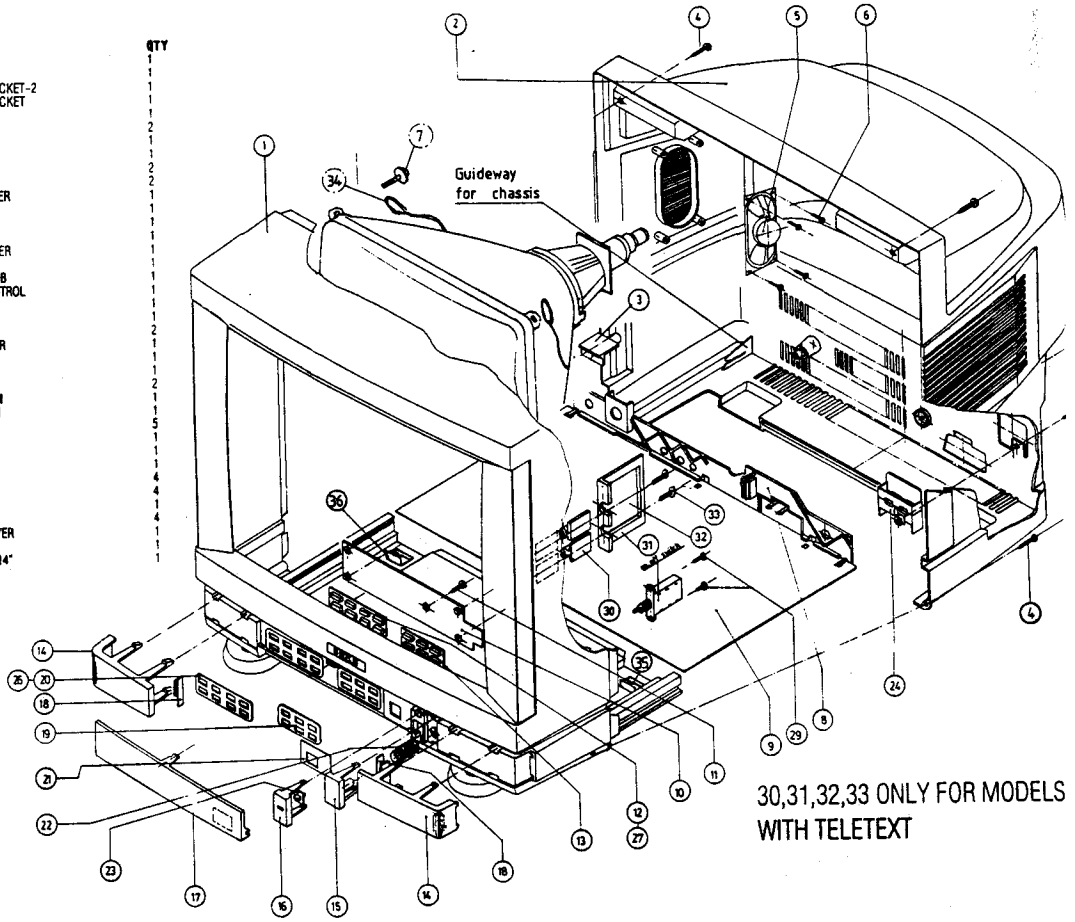


Figure 3

30,31,32,33 ONLY FOR MODELS WITH TELETEXT

27,28,29 ONLY FOR MODELS WITH TELETEXT
28 ONLY FOR 21" MODELS

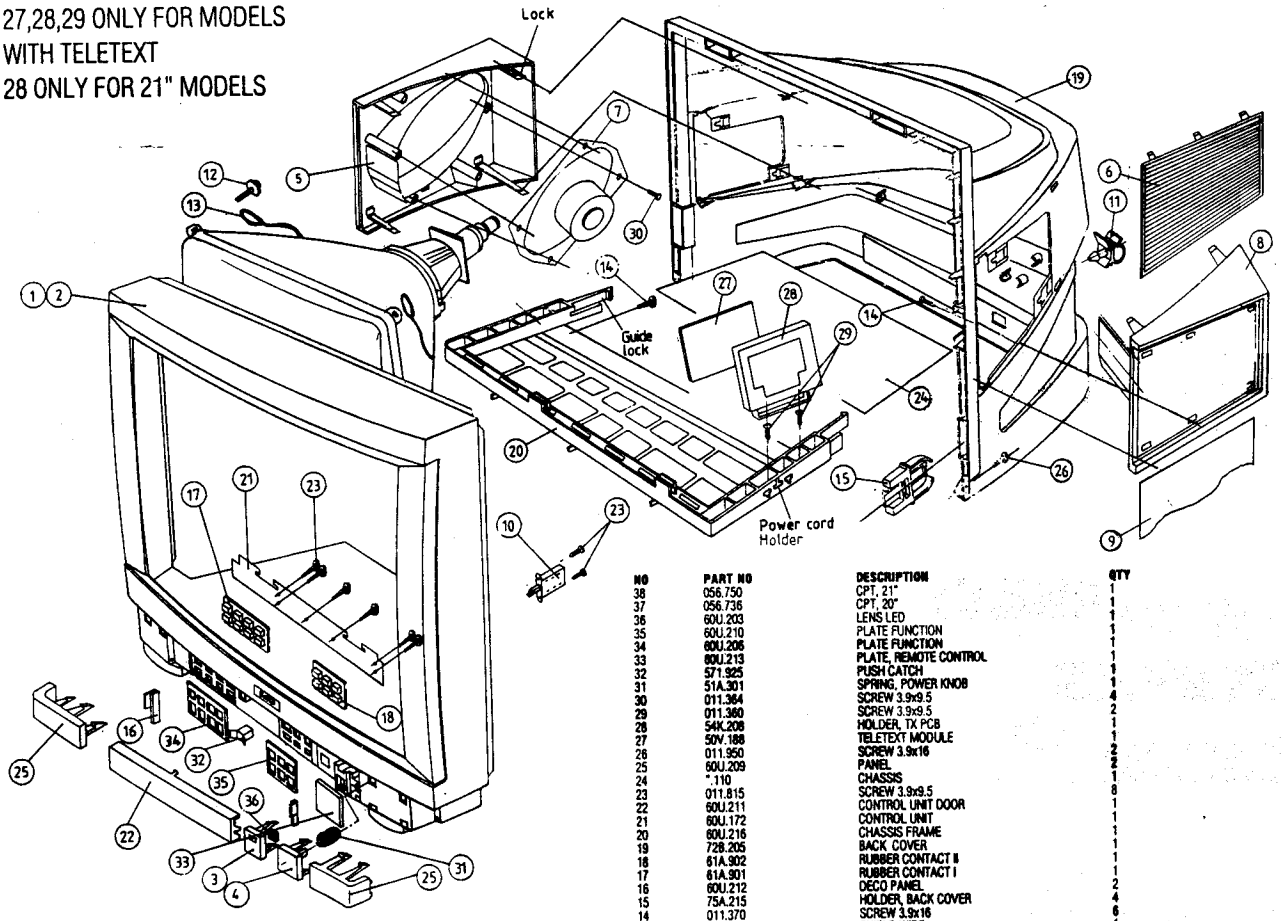
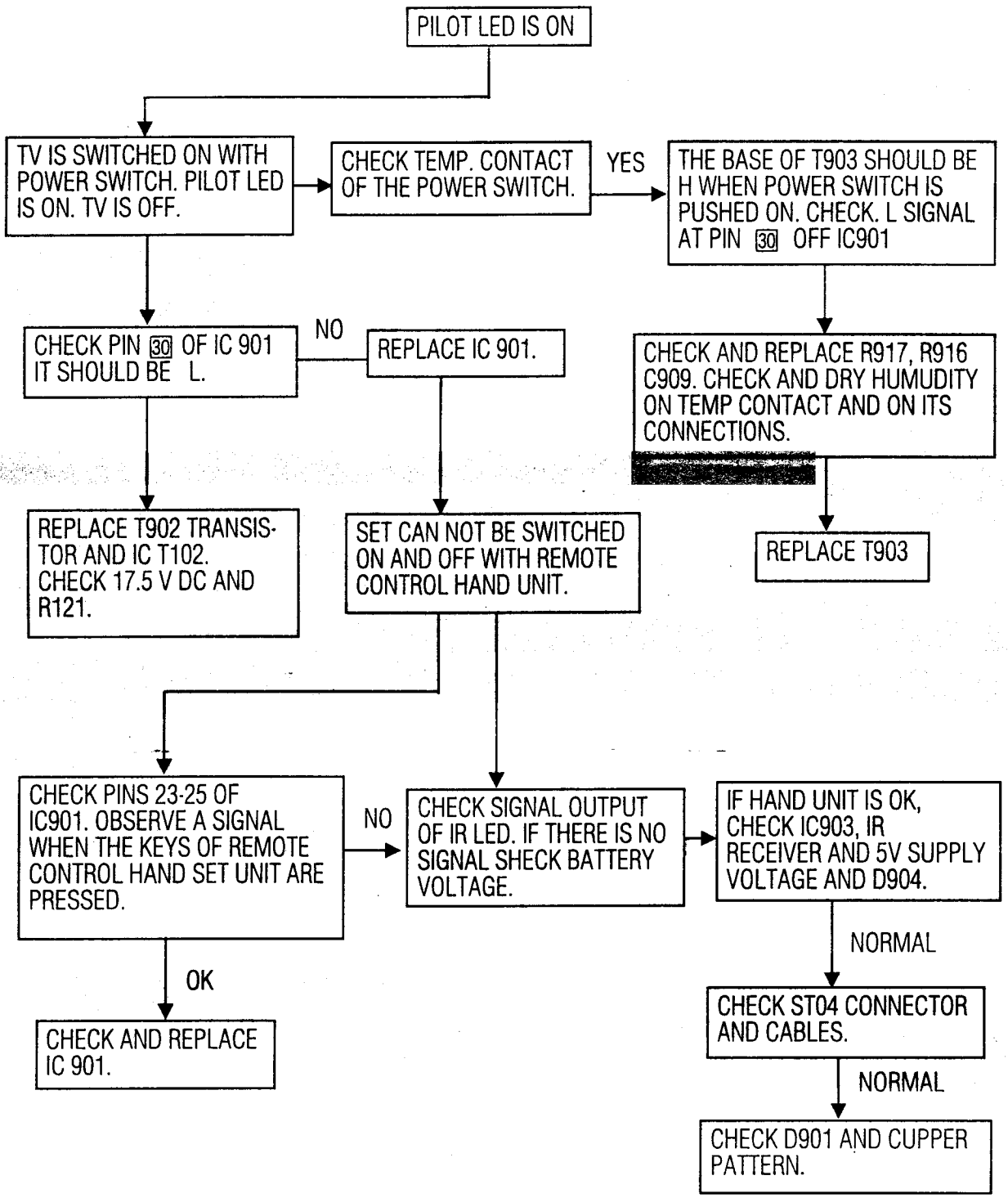


Figure 4

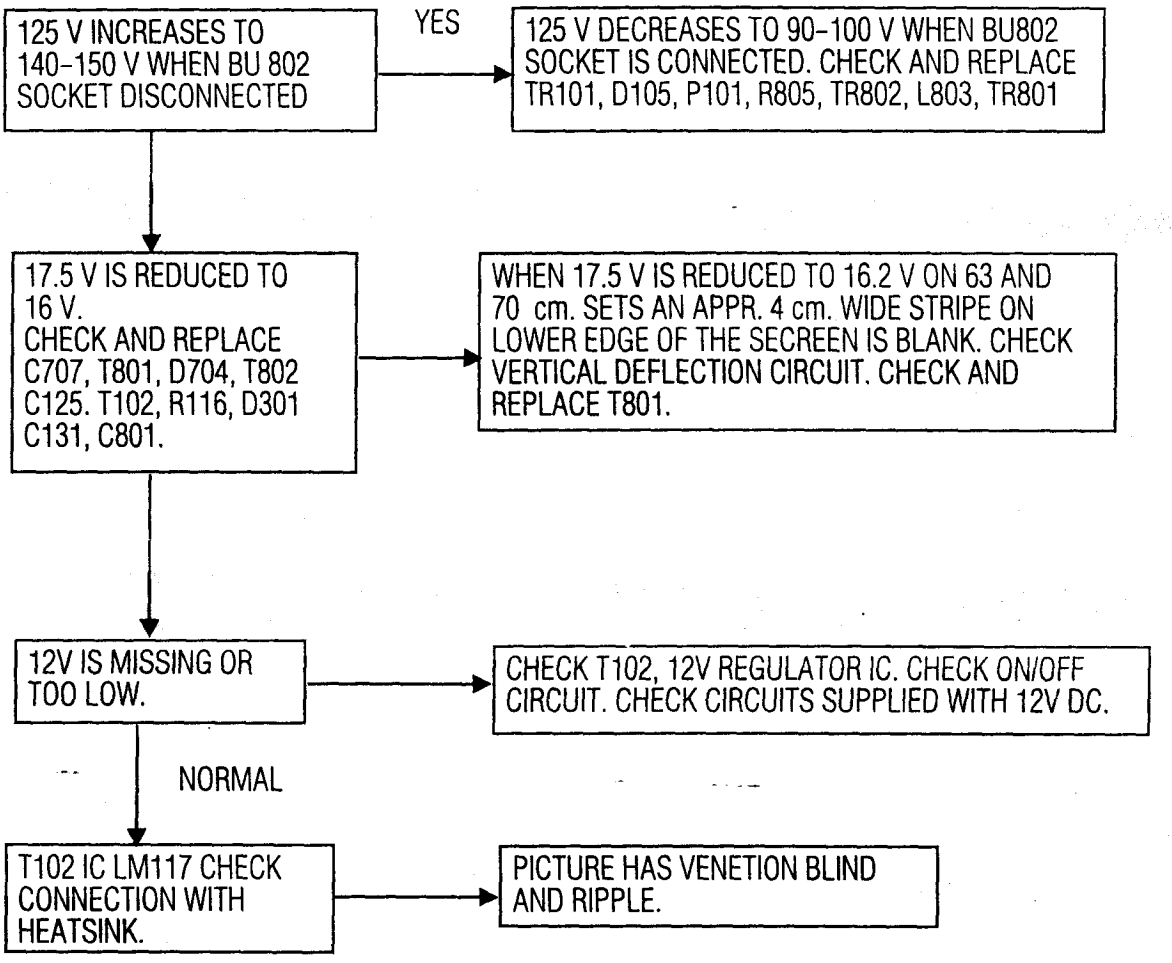
(20"-21" MODELS)

NO	PART NO	DESCRIPTION	QTY
38	056.750	CPT, 21"	1
37	056.736	CPT, 20"	1
36	60U.203	LENS LED	1
35	60U.210	PLATE FUNCTION	1
34	60U.206	PLATE FUNCTION	1
33	60U.213	PLATE, REMOTE CONTROL	1
32	571.925	PUSH CATCH	1
31	51A.301	SPRING, POWER KNOB	1
30	011.364	SCREW 3.9x9.5	4
29	011.360	SCREW 3.9x9.5	2
28	54K.208	HOLDER, TX PCB	1
27	50V.188	TELETEXT MODULE	1
26	011.950	SCREW 3.9x16	2
25	60U.209	PANEL	2
24	".110	CHASSIS	1
23	011.815	SCREW 3.9x9.5	8
22	60U.211	CONTROL UNIT DOOR	1
21	60U.172	CONTROL UNIT	1
20	60U.216	CHASSIS FRAME	1
19	728.205	BACK COVER	1
18	61A.902	RUBBER CONTACT II	1
17	61A.901	RUBBER CONTACT I	1
16	60U.212	DECO PANEL	2
15	75A.215	HOLDER, BACK COVER	4
14	011.370	SCREW 3.9x16	6
13	033.929	SHIELD WIRE	1
12	011.507	SCREW CPT (EJOT)	4
11	833.215	POWER CORD HANGER	1
10	010.770	POWER SWITCH	1
9	728.901	CLOTH, SPEAKER	2
8	72W.207	HOLDER SPEAKER	1
7	850.107	SPEAKER	1
6	728.240	GRID, SPEAKER	2
5	728.206	HOLDER SPEAKER	2
4	[illegible]	POWER KNOB	1
3	[illegible]	LED COVER	1
2	[illegible]	FRONT FRAME (21")	1
1	[illegible]	FRONT FRAME (20")	1

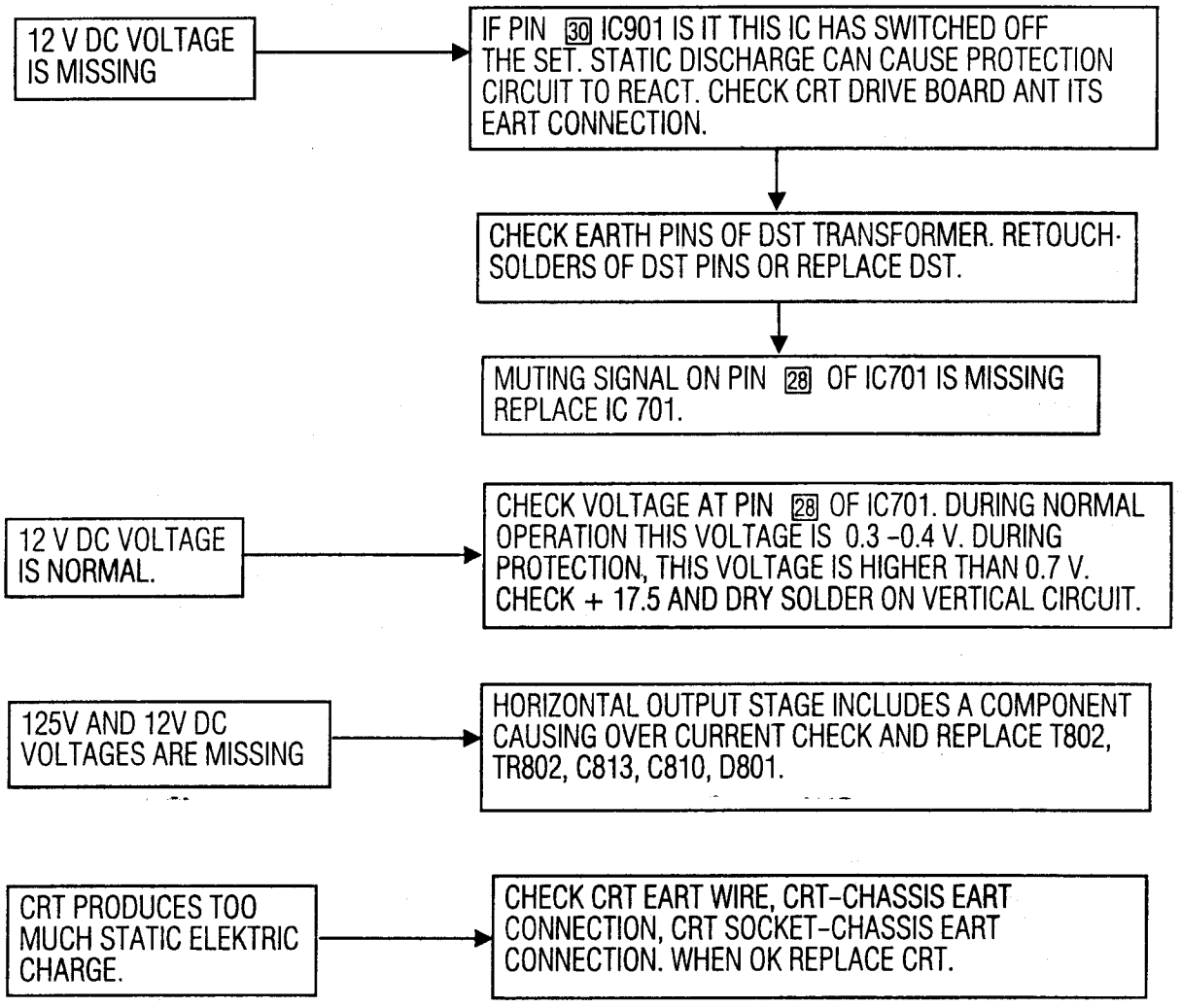
④
POWER II DEFECTS


PILOT LED IS ON
TV IS SWITCHED ON WITH POWER SWITCH. PILOT LED IS ON. TV IS OFF.
CHECK TEMP. CONTACT OF THE POWER SWITCH.
YES
THE BASE OF T903 SHOULD BE H WHEN POWER SWITCH IS PUSHED ON. CHECK. L SIGNAL AT PIN 30 OFF IC901
CHECK PIN 30 OF IC 901 IT SHOULD BE L.
NO
REPLACE IC 901.
CHECK AND REPLACE R917, R916 C909. CHECK AND DRY HUMUDITY ON TEMP CONTACT AND ON ITS CONNECTIONS.
REPLACE T902 TRANSISTOR AND IC T102. CHECK 17.5 V DC AND R121.
SET CAN NOT BE SWITCHED ON AND OFF WITH REMOTE CONTROL HAND UNIT.
REPLACE T903
CHECK PINS 23-25 OF IC901. OBSERVE A SIGNAL WHEN THE KEYS OF REMOTE CONTROL HAND SET UNIT ARE PRESSED.
NO
CHECK SIGNAL OUTPUT OF IR LED. IF THERE IS NO SIGNAL SHECK BATTERY VOLTAGE.
IF HAND UNIT IS OK, CHECK IC903, IR RECEIVER AND 5V SUPPLY VOLTAGE AND D904.
OK
NORMAL
CHECK AND REPLACE IC 901.
CHECK ST04 CONNECTOR AND CABLES.
NORMAL
CHECK D901 AND CUPPER PATTERN.

⑤
SWITCH MODE TRANSFORMER TR101 AND PERIPERIAL DEFECTS


125 V INCREASES TO 140-150 V WHEN BU 802 SOCKET DISCONNECTED
YES
125 V DECREASES TO 90-100 V WHEN BU802 SOCKET IS CONNECTED. CHECK AND REPLACE TR101, D105, P101, R805, TR802, L803, TR801
17.5 V IS REDUCED TO 16 V. CHECK AND REPLACE C707, T801, D704, T802 C125. T102, R116, D301 C131, C801.
WHEN 17.5 V IS REDUCED TO 16.2 V ON 63 AND 70 cm. SETS AN APPR. 4 cm. WIDE STRIPE ON LOWER EDGE OF THE SECREEN IS BLANK. CHECK VERTICAL DEFLECTION CIRCUIT. CHECK AND REPLACE T801.
12V IS MISSING OR TOO LOW.
CHECK T102, 12V REGULATOR IC. CHECK ON/OFF CIRCUIT. CHECK CIRCUITS SUPPLIED WITH 12V DC.
NORMAL
T102 IC LM117 CHECK CONNECTION WITH HEATSINK.
PICTURE HAS VENETION BLIND AND RIPPLE.

⑥
SET GOES TO STANDBY DURING OPERATION


12 V DC VOLTAGE IS MISSING
IF PIN 30 IC901 IS IT THIS IC HAS SWITCHED OFF THE SET. STATIC DISCHARGE CAN CAUSE PROTECTION CIRCUIT TO REACT. CHECK CRT DRIVE BOARD ANT ITS EART CONNECTION.
CHECK EARTH PINS OF DST TRANSFORMER. RETOUCH· SOLDERS OF DST PINS OR REPLACE DST.
MUTING SIGNAL ON PIN 28 OF IC701 IS MISSING REPLACE IC 701.
12 V DC VOLTAGE IS NORMAL.
CHECK VOLTAGE AT PIN 28 OF IC701. DURING NORMAL OPERATION THIS VOLTAGE IS 0.3 -0.4 V. DURING PROTECTION, THIS VOLTAGE IS HIGHER THAN 0.7 V. CHECK + 17.5 AND DRY SOLDER ON VERTICAL CIRCUIT.
125V AND 12V DC VOLTAGES ARE MISSING
HORIZONTAL OUTPUT STAGE INCLUDES A COMPONENT CAUSING OVER CURRENT CHECK AND REPLACE T802, TR802, C813, C810, D801.
CRT PRODUCES TOO MUCH STATIC ELEKTRIC CHARGE.
CHECK CRT EART WIRE, CRT-CHASSIS EART CONNECTION, CRT SOCKET-CHASSIS EART CONNECTION. WHEN OK REPLACE CRT.

NOTICE: MAINS VOLTAGE OUTLETS IN COSTUMER HOUSE HAS TO BE CHECKED, BEFORE STARTING ANY OFF ABOVE MENTIONED MEASUREMENTS.

⑦

SCREEN IS DARK. WHEN SCREEN POTENTIOMETER TURNED CLOCKWISE RASTER AND FLYBACKLINES APPEAR ON SCREEN.

CHECK SDA AND SCL SIGNALS AND 4V DC AT PINS [31] ,[32] OF IC 901.

IF ONE OF SDA OR SCL IS MISSING.

IN MONO SETS SDA AND SCL SIGNAL LİNES ARE SEPARATED FROM TELETEXT BOARD TUNER AND MEMORY IC. THIS WAY SHORT CIRCUIT OF THIS SIGNALS CAN BE LOCALIZED. IN STEREO SETS SDA AND SCL SIGNAL LINES ARE SEPARATED FROM STEREO BOARD OR IF BOARD. SHORT CIRCUIT CAN BE LOCALIZED, AND DEFECTIVE MODULE CAN BE REPLACED.

SDA-SCL SIGNALS ARE NORMAL, SCREEN IS DARK.

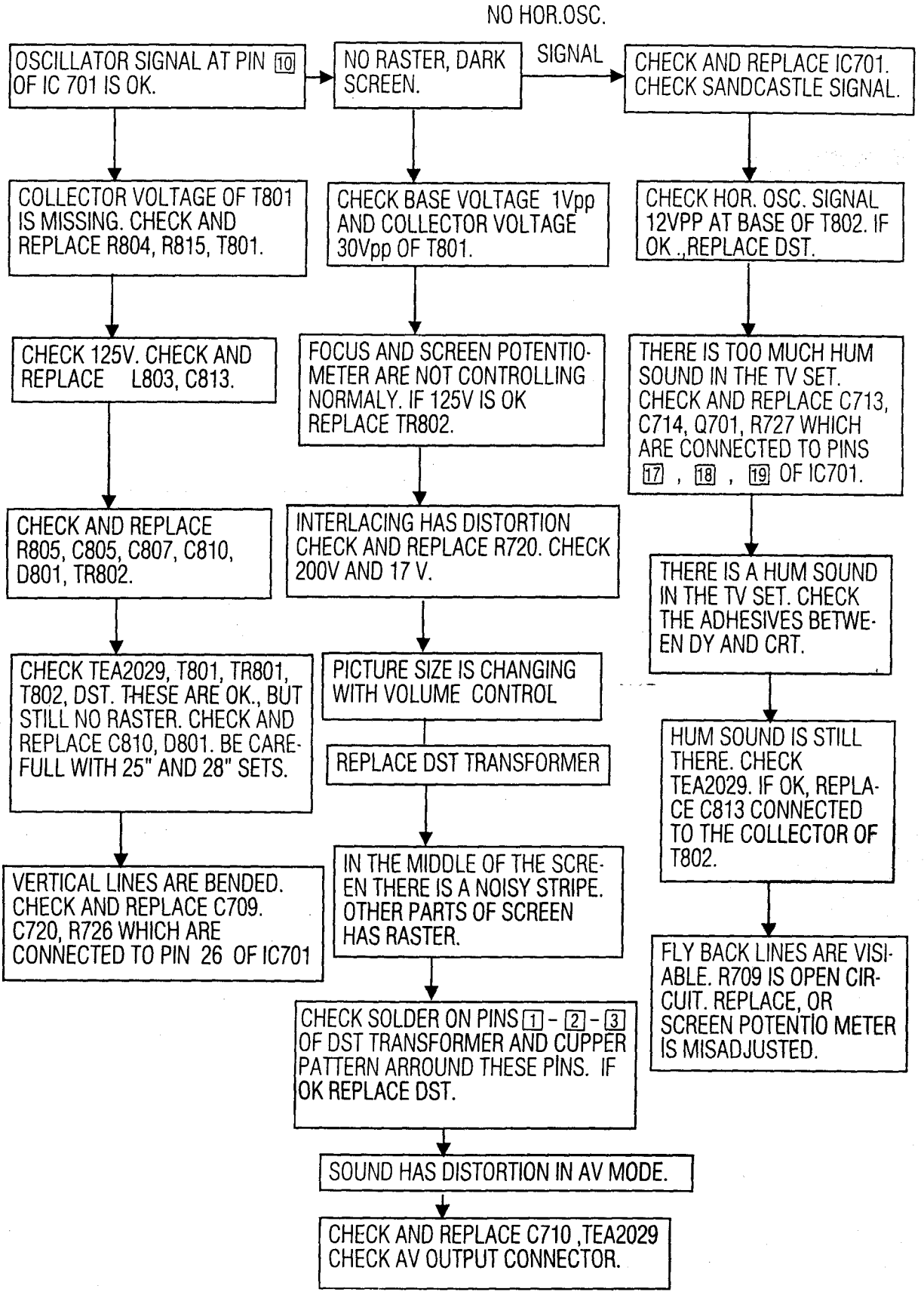
CHECK PIN VOLTAGES AND SURROUND COMPONENTS OF IC501. CHECK 1 V AT PIN [26]. PINS [19] , [20] ARE FOR CONTRAST AND BRIGHTNESS. CHECK VOLTAGES AT THESE PINS VARIING BETWEEN 1-4.5 V.CHECK 12V DC AT PIN [6]. CHECK Y-LUMINANCE SIGNAL ON PIN [15]. IF ALL ITEMS ARE NORMAL , IC501 OR CRT DRIVE BOARD IS DEFECTIVE.

REPLACE CRT DRIVE BOARD. CHECK AND REPLACE D501, D503, C503.
CHECK VOLTAGE AT PIN [9] OF IC501.

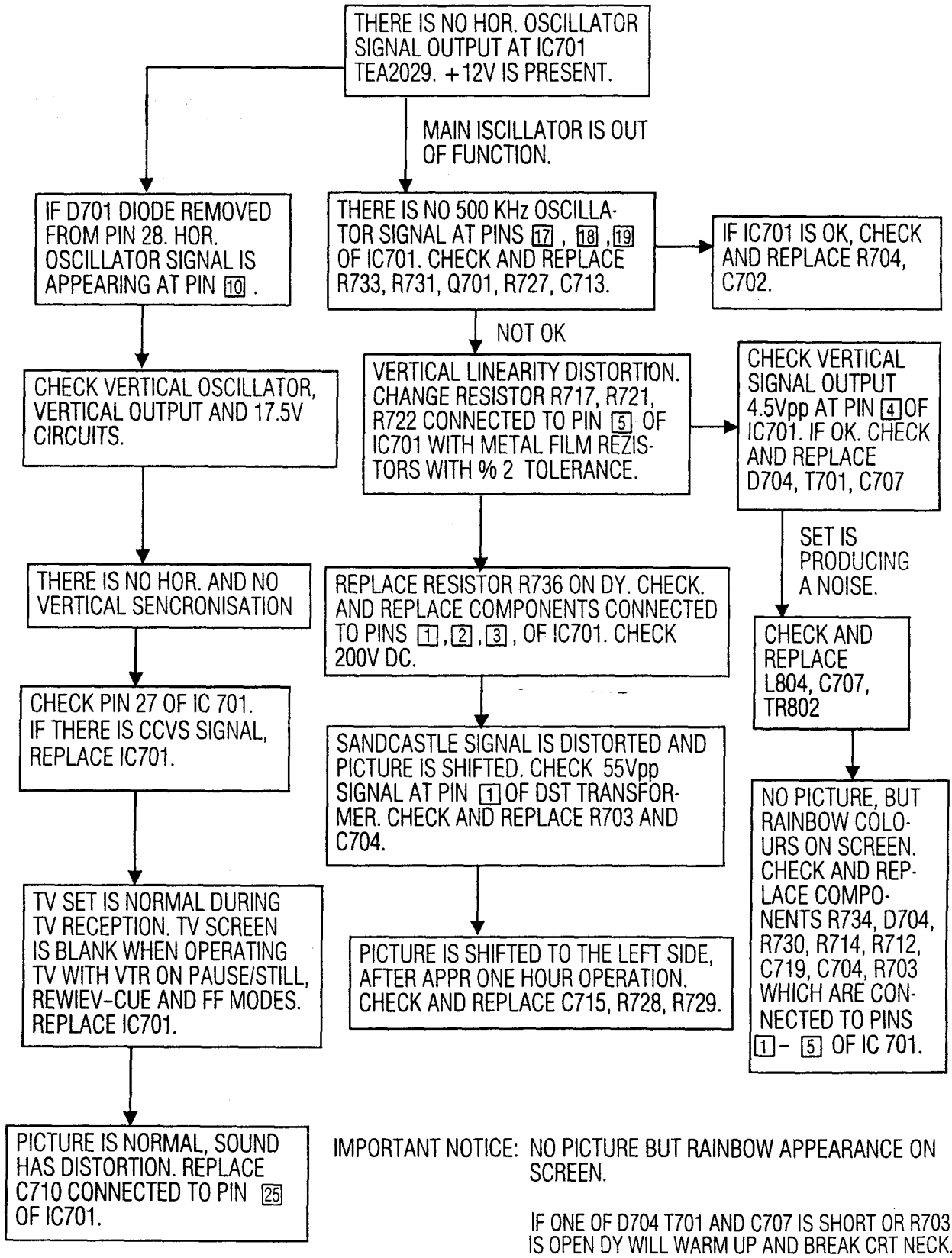
SCREEN IS DARK. RASTER IS AVAIBLE.

PUSH AV BUTTON ON REMOTE CONTROL HAND UNIT. CHECK SQUARE WAVE ON PIN [15] OF IC 501. IF OK, CHECK SQUARE WAVE AT PINS [1], [3], [5].
IF OK, CRT DRIVE BOARD IS DEFECTIVE. IF NOT, REPLACE IC501.

8
VERTICAL-HORIZONTAL OUTPUT AND DST CIRCUIT DEFECTS

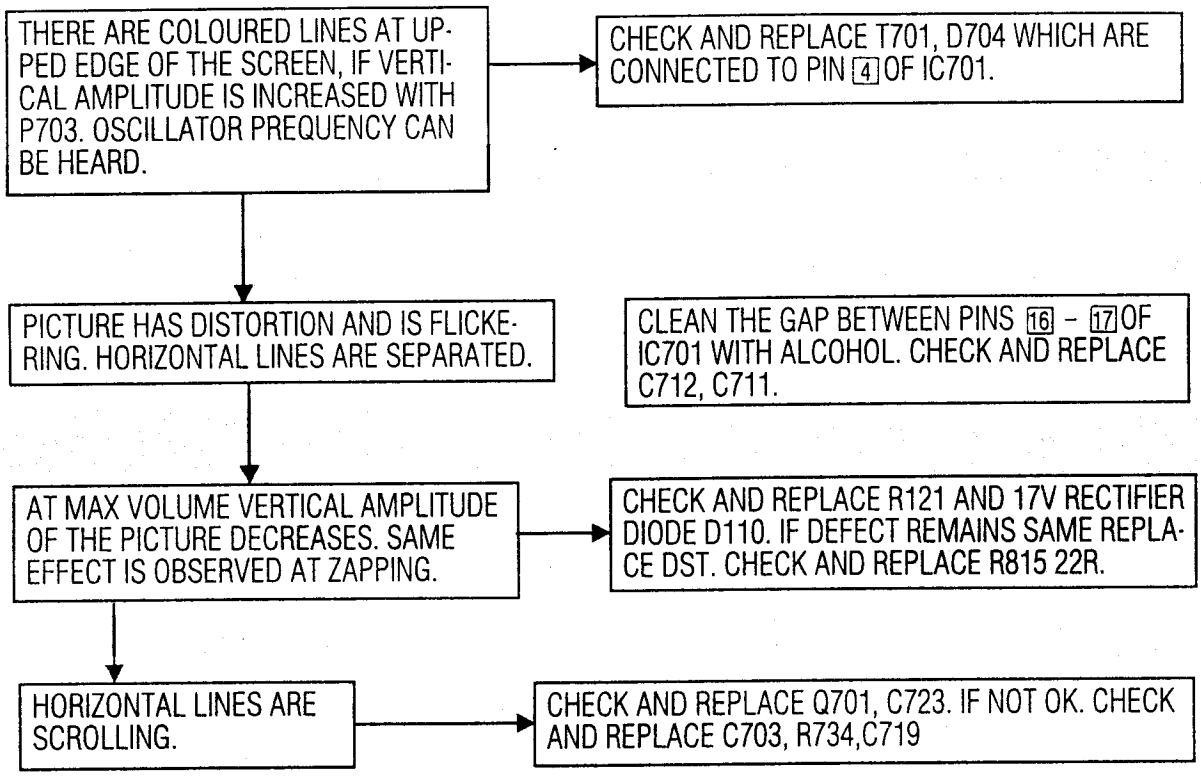

NO HOR.OSC.
OSCILLATOR SIGNAL AT PIN 10 OF IC 701 IS OK.
NO RASTER, DARK SCREEN.
SIGNAL
CHECK AND REPLACE IC701. CHECK SANDCASTLE SIGNAL.
COLLECTOR VOLTAGE OF T801 IS MISSING. CHECK AND REPLACE R804, R815, T801.
CHECK BASE VOLTAGE 1Vpp AND COLLECTOR VOLTAGE 30Vpp OF T801.
CHECK HOR. OSC. SIGNAL 12VPP AT BASE OF T802. IF OK .,REPLACE DST.
CHECK 125V. CHECK AND REPLACE L803, C813.
FOCUS AND SCREEN POTENTIO-METER ARE NOT CONTROLLING NORMALY. IF 125V IS OK REPLACE TR802.
THERE IS TOO MUCH HUM SOUND IN THE TV SET. CHECK AND REPLACE C713, C714, Q701, R727 WHICH ARE CONNECTED TO PINS 17 , 18 , 19 OF IC701.
CHECK AND REPLACE R805, C805, C807, C810, D801, TR802.
INTERLACING HAS DISTORTION CHECK AND REPLACE R720. CHECK 200V AND 17 V.
THERE IS A HUM SOUND IN THE TV SET. CHECK THE ADHESIVES BETWE-EN DY AND CRT.
CHECK TEA2029, T801, TR801, T802, DST. THESE ARE OK., BUT STILL NO RASTER. CHECK AND REPLACE C810, D801. BE CARE-FULL WITH 25" AND 28" SETS.
PICTURE SIZE IS CHANGING WITH VOLUME CONTROL
REPLACE DST TRANSFORMER
HUM SOUND IS STILL THERE. CHECK TEA2029. IF OK, REPLA-CE C813 CONNECTED TO THE COLLECTOR OF T802.
VERTICAL LINES ARE BENDED. CHECK AND REPLACE C709. C720, R726 WHICH ARE CONNECTED TO PIN 26 OF IC701
IN THE MIDDLE OF THE SCRE-EN THERE IS A NOISY STRIPE. OTHER PARTS OF SCREEN HAS RASTER.
FLY BACK LINES ARE VISI-ABLE. R709 IS OPEN CIR-CUIT. REPLACE, OR SCREEN POTENTIO METER IS MISADJUSTED.
CHECK SOLDER ON PINS 1 - 2 - 3 OF DST TRANSFORMER AND CUPPER PATTERN ARROUND THESE PINS. IF OK REPLACE DST.
SOUND HAS DISTORTION IN AV MODE.
CHECK AND REPLACE C710 ,TEA2029 CHECK AV OUTPUT CONNECTOR.

9
TEA 2029 AND PERIPHERIAL CIRCUIT DEFECTS

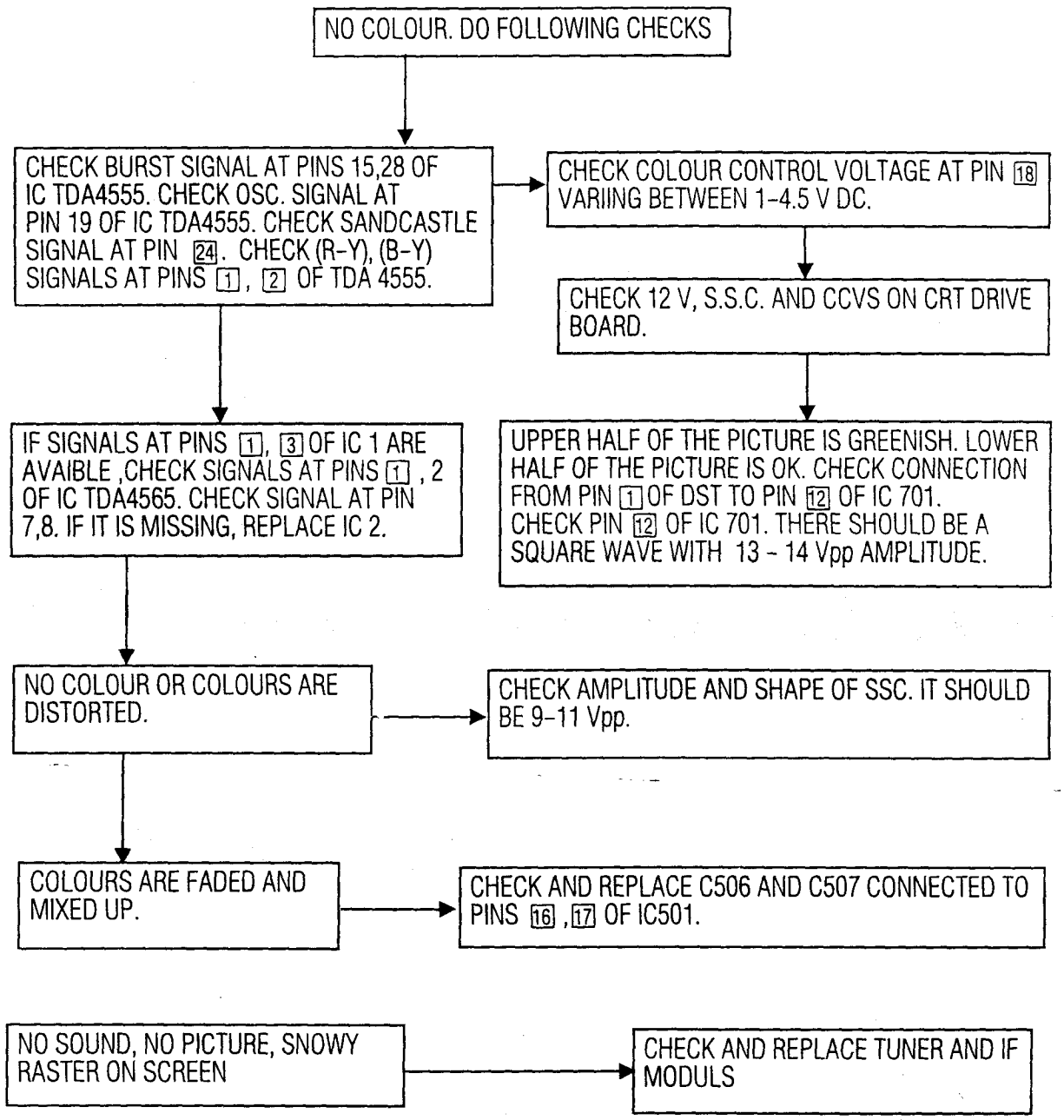

THERE IS NO HOR. OSCILLATOR SIGNAL OUTPUT AT IC701 TEA2029. +12V IS PRESENT.
MAIN ISCILLATOR IS OUT OF FUNCTION.
IF D701 DIODE REMOVED FROM PIN 28. HOR. OSCILLATOR SIGNAL IS APPEARING AT PIN [10].
THERE IS NO 500 KHz OSCILLATOR SIGNAL AT PINS [17], [18], [19] OF IC701. CHECK AND REPLACE R733, R731, Q701, R727, C713.
IF IC701 IS OK, CHECK AND REPLACE R704, C702.
NOT OK
CHECK VERTICAL OSCILLATOR, VERTICAL OUTPUT AND 17.5V CIRCUITS.
VERTICAL LINEARITY DISTORTION. CHANGE RESISTOR R717, R721, R722 CONNECTED TO PIN [5] OF IC701 WITH METAL FILM REZISTORS WITH % 2 TOLERANCE.
CHECK VERTICAL SIGNAL OUTPUT 4.5Vpp AT PIN [4] OF IC701. IF OK. CHECK AND REPLACE D704, T701, C707
SET IS PRODUCING A NOISE.
THERE IS NO HOR. AND NO VERTICAL SENCRONISATION
REPLACE RESISTOR R736 ON DY. CHECK. AND REPLACE COMPONENTS CONNECTED TO PINS [1], [2], [3], OF IC701. CHECK 200V DC.
CHECK AND REPLACE L804, C707, TR802
CHECK PIN 27 OF IC 701. IF THERE IS CCVS SIGNAL, REPLACE IC701.
SANDCASTLE SIGNAL IS DISTORTED AND PICTURE IS SHIFTED. CHECK 55Vpp SIGNAL AT PIN [1] OF DST TRANSFORMER. CHECK AND REPLACE R703 AND C704.
NO PICTURE, BUT RAINBOW COLOURS ON SCREEN. CHECK AND REPLACE COMPONENTS R734, D704, R730, R714, R712, C719, C704, R703 WHICH ARE CONNECTED TO PINS [1] - [5] OF IC 701.
TV SET IS NORMAL DURING TV RECEPTION. TV SCREEN IS BLANK WHEN OPERATING TV WITH VTR ON PAUSE/STILL, REWIEV-CUE AND FF MODES. REPLACE IC701.
PICTURE IS SHIFTED TO THE LEFT SIDE, AFTER APPR ONE HOUR OPERATION. CHECK AND REPLACE C715, R728, R729.
PICTURE IS NORMAL, SOUND HAS DISTORTION. REPLACE C710 CONNECTED TO PIN [25] OF IC701.

IMPORTANT NOTICE: NO PICTURE BUT RAINBOW APPEARANCE ON SCREEN.

IF ONE OF D704 T701 AND C707 IS SHORT OR R703 IS OPEN DY WILL WARM UP AND BREAK CRT NECK.


THERE ARE COLOURED LINES AT UPPED EDGE OF THE SCREEN, IF VERTICAL AMPLITUDE IS INCREASED WITH P703. OSCILLATOR PREQUENCY CAN BE HEARD.
CHECK AND REPLACE T701, D704 WHICH ARE CONNECTED TO PIN 4 OF IC701.
PICTURE HAS DISTORTION AND IS FLICKERING. HORIZONTAL LINES ARE SEPARATED.
CLEAN THE GAP BETWEEN PINS 16 - 17 OF IC701 WITH ALCOHOL. CHECK AND REPLACE C712, C711.
AT MAX VOLUME VERTICAL AMPLITUDE OF THE PICTURE DECREASES. SAME EFFECT IS OBSERVED AT ZAPPING.
CHECK AND REPLACE R121 AND 17V RECTIFIER DIODE D110. IF DEFECT REMAINS SAME REPLACE DST. CHECK AND REPLACE R815 22R.
HORIZONTAL LINES ARE SCROLLING.
CHECK AND REPLACE Q701, C723. IF NOT OK. CHECK AND REPLACE C703, R734,C719

⑩
COLOUR DECODER DEFECTS


NO COLOUR. DO FOLLOWING CHECKS
CHECK BURST SIGNAL AT PINS 15,28 OF IC TDA4555. CHECK OSC. SIGNAL AT PIN 19 OF IC TDA4555. CHECK SANDCASTLE SIGNAL AT PIN 24. CHECK (R-Y), (B-Y) SIGNALS AT PINS 1, 2 OF TDA 4555.
CHECK COLOUR CONTROL VOLTAGE AT PIN 18 VARIING BETWEEN 1-4.5 V DC.
CHECK 12 V, S.S.C. AND CCVS ON CRT DRIVE BOARD.
IF SIGNALS AT PINS 1, 3 OF IC 1 ARE AVAIBLE ,CHECK SIGNALS AT PINS 1 , 2 OF IC TDA4565. CHECK SIGNAL AT PIN 7,8. IF IT IS MISSING, REPLACE IC 2.
UPPER HALF OF THE PICTURE IS GREENISH. LOWER HALF OF THE PICTURE IS OK. CHECK CONNECTION FROM PIN 1 OF DST TO PIN 12 OF IC 701. CHECK PIN 12 OF IC 701. THERE SHOULD BE A SQUARE WAVE WITH 13 - 14 Vpp AMPLITUDE.
NO COLOUR OR COLOURS ARE DISTORTED.
CHECK AMPLITUDE AND SHAPE OF SSC. IT SHOULD BE 9-11 Vpp.
COLOURS ARE FADED AND MIXED UP.
CHECK AND REPLACE C506 AND C507 CONNECTED TO PINS 16 ,17 OF IC501.
NO SOUND, NO PICTURE, SNOWY RASTER ON SCREEN
CHECK AND REPLACE TUNER AND IF MODULS

WIRING DIAGRAM

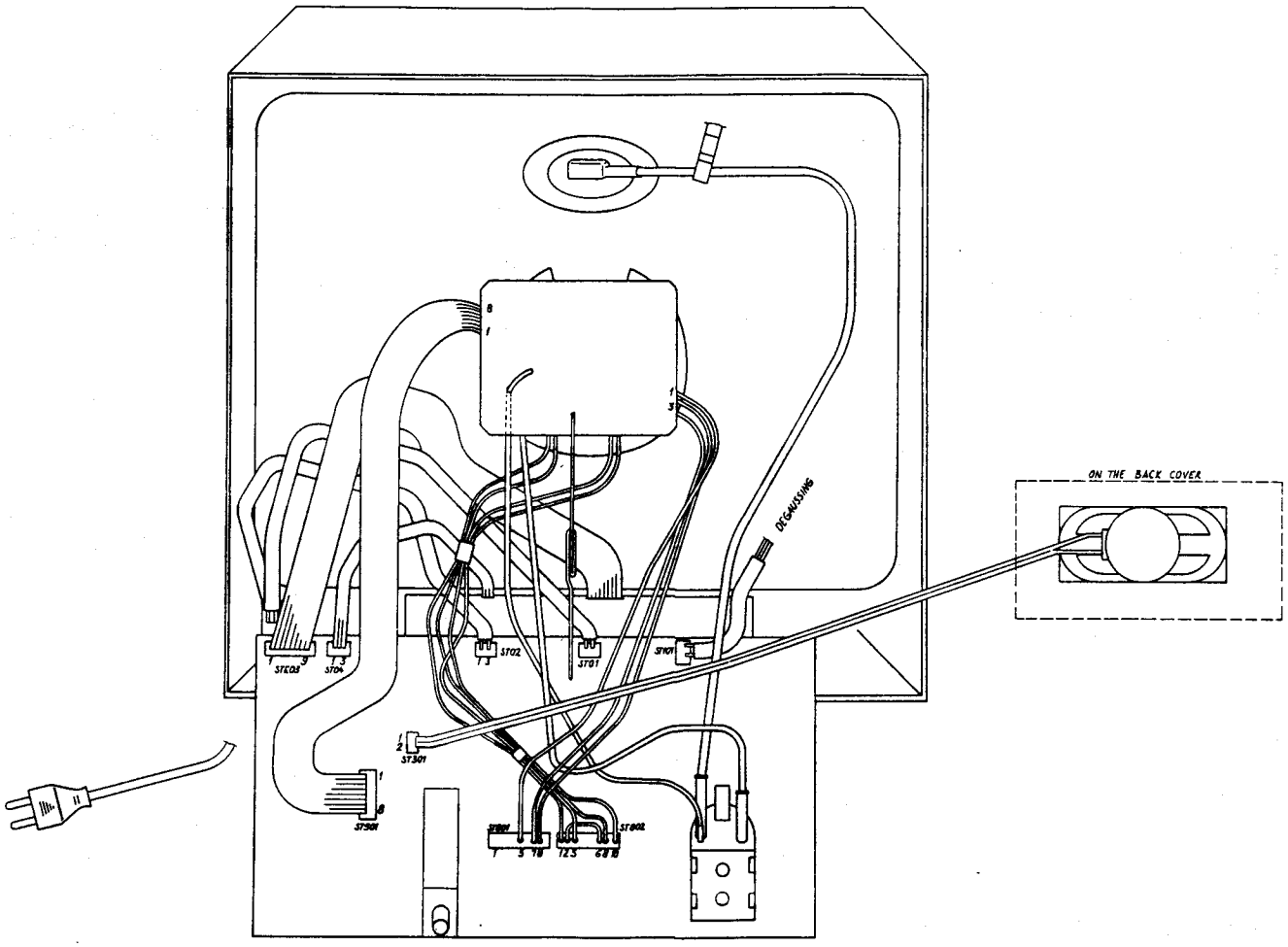
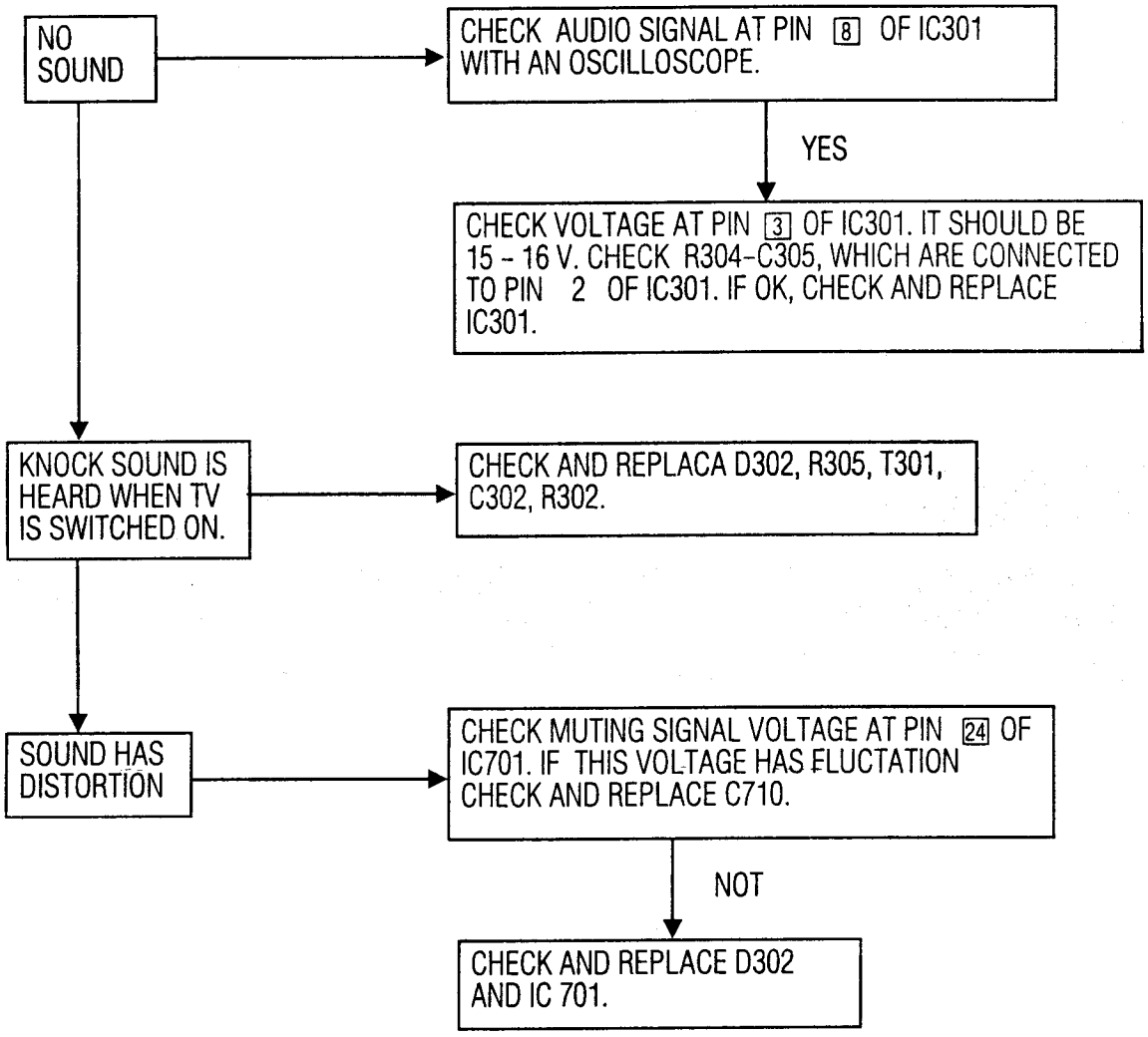


Figure 5

⑬
SOUND CIRCUIT DEFECTS


NO SOUND
CHECK AUDIO SIGNAL AT PIN [8] OF IC301 WITH AN OSCILLOSCOPE.
YES
CHECK VOLTAGE AT PIN [3] OF IC301. IT SHOULD BE 15 - 16 V. CHECK R304-C305, WHICH ARE CONNECTED TO PIN 2 OF IC301. IF OK, CHECK AND REPLACE IC301.
KNOCK SOUND IS HEARD WHEN TV IS SWITCHED ON.
CHECK AND REPLACA D302, R305, T301, C302, R302.
SOUND HAS DISTORTION
CHECK MUTING SIGNAL VOLTAGE AT PIN [24] OF IC701. IF THIS VOLTAGE HAS FLUCTATION CHECK AND REPLACE C710.
NOT
CHECK AND REPLACE D302 AND IC 701.

SPARE PARTS

PART NUMBER	DISCRIPTION	POSITION
010770	POWER SWITCH ME5-S2	—
031228	PERI SOCKET	ST502
031960	CRT SOCKET (B10227 TYPE)	—
038905	POWER CORD L=2400	—
051581	DST AT2 90	TR802
051583	LINE FILTER 27UH	L101
051584	COIL H-AMPL	L801
051585	COIL H—LIN	L802
051587	DRIVER TRANSFORMER	TR801
051609	SMPS AT2 90 II	TR101
051610	COIL CHOKE VERTICAL 500UH	L804
052495	COIL ANTENNA SW	L201
053498	COIL 1.2UH	L803
053499	COIL 7UH	—
053500	COIL 10UH K	L106 L410
053501	COIL 330UH	L502
053502	COIL 22UH	L501
053505	FILTER SFE5.5MC	F204
053506	COIL DEMOD	F203
053508	COIL TPC 5.5MC	F202
053511	DELAY LINE 5DL145	DL401
053512	COIL 8128-A3753	FI205 FI406 FI407 FI408 FI409
053513	COIL CHROMA 4.4MHH	FI404
053523	COIL A4449	FI401
053525	COIL 2K843EG	FI403
053529	COIL 100UH	DR402
053547	COIL 3UH	L301 L302
053600	COIL DISKR. 6.5MHZ	F202
053601	COIL DISKR. 5.5 MHZ	F205
053633	COIL 10UH (RAD)	DR401 L202
054230	FUSE 3.15AT	FU101
054275	FUSE 1.25A (DELAY)	FU102
056065	SAW FILTER OFW K2950	F201
056066	CER.FILTER TPS 6.5MB	FI207
056067	CER.FILTER SFE6.5MC	FI208
056736	CRT SS 5109B22TC-DSE-1992JL	—
056946	CHRYSTAL 12MHZ	Q901
056947	CHRYSTAL 500KHZ	Q701
056955	CRYSTAL 8.8MHZ	Q401
100224	CFR 22R J 1/4W	R713
100473	CFR 47R J 1/4W	R106 R113
100684	CFR 68R J 1/4W	R403
100751	CFR 75R J 1/4W	R516
101106	CFR 100R J 1/4W	RI901 R114 R945 R947 R924
101154	CFR 150R J 1/4W	R944
101223	CFR 220R J 1/4W	R109 R731
101274	CFR 270R J 1/4W	R801 R802
101395	CFR 390R J 1/4W	R1203
101470	CFR 470R J 1/4W	R733
101562	CFR 560R J 1/4W	R934 R935 R936
101683	CFR 680R J 1/4W	R207
101820	CFR 820R J 1/4W	R1202
102101	CFR 1K J 1/4W	R104 R705 R740 R448 R210 R923
102126	CFR 1.2K J 1/4W	R1236 R1237 R444
102157	CFR 1.5K J 1/4W	R1207 R1209 R1211 R408 R422
102189	CFR 1.8K J 1/4W	R1201
102198	CFR 1.3K J 1/4W	R120
102227	CFR 2.2K J 1/4W	R942 R943 R424
102338	CFR 3.3K J 1/4W	R1225 R216 R217
102479	CFR 4.7K J 1/4W	R117 R732 R902 R904 R906 R908 R910 R919 R915 R946 R215

PART NUMBER	DISCRIPTION	POSITION
102563	CFR 5.6K J 1/4W	R940
102685	CFR 6.8K J 1/4W	R110 R112
102825	CFR 8.2K J 1/4W	R909
103116	CFR 10K J 1/4W	R901 R903 R905 R907 R911 R93 R939 R439
103155	CFR 15K J 1/4W	R926 R927 R928 R929 R930 R93 R932 R933 R419 R421
103224	CFR 22K J 1/4W	R306 R509 R703
103273	CFR 27K J 1/4W	R938
103475	CFR 47K J 1/4W	R1222 R1229 R922
103561	CFR 56K J 1/4W	R510 R511 R512 R941
104110	CFR 100K J 1/4W	R920 R921
104151	CFR 150K J 1/4W	R925
104185	CFR 180K J 1/4W	R1219
104222	CFR 220K J 1/4W	R1221
104273	CFR 270K J 1/4W	R1220
104332	CFR 330K J 1/4W	R1234
104470	CFR 470K J 1/4W	R807
105106	CFR 1M J 1/4W	R722
106100	CFR 10M J 1/4W	R916 R917
109106	CFR 1R J 1/4W	R304
109224	CFR 2.2R J 1/4W	R701
109473	CFR 4.7R J 1/4W	—
1113222	CFR 22K J 1/4W	R1213 R1214 R1215
113270	RMO 27K J 2W	R115 R61
113330	RMO 33K J 2W	R105
113477	RMO 47K J 2W	R118 R1208 R1210 R1212
114330	RMO 330K J 1.5W	R112
114820	RMO 820K J 1.5W	R111
115473	RM 4.7M %1. 1W	R102 R103
119475	RMO 4.7R J 1.5W	R715
121153	RW 150R J 2W	R803
122112	RW 1K J 1.5W	—
129109	RW .1R J .75W	R121 R122 R123 R808 R1225
129273	RW 2.7R J 4W	—
129486	RW 4.7R J 11W	R805
131224	R—VAR 220R	P401
131250	R-VAR 250R	P703
132129	R-POT 1K	P1201 P1202 P1203
132252	R-VAR 2.5K (V)	P101
132253	R-VAR 2.5K (H)	P702
132475	R-VAR 4.7K	P501
133147	R-VAR 10K	P201
133253	R-VAR 25K	P701
134234	R-POT 220K	P1204 P1205
154213	PTC DEGAUSSING COIL 98009	R124
154216	4.7R S234	R101
200222	CC 22PF J 100V	C434 C437
200331	CC 33PF J 63V	C906 C907 C920 C1210
200472	CC 47PF J 63V	C913 C915
200473	CC 47PF J 63V	C501 C1203 C1203
200564	CC 56PF J 63V	C1209
200682	CC 68PF	C427 C441
201102	CC 100PF J 63V	C914
201104	CC 100PF J 63V	C117 C924 C210
201105	CC 100PF K 63V	C428 C431
201124	CC 120PF K 63V	C408 C435 C442 C446
201151	CC 150PF J 63V	C802
201152	CC 150PF	C412
201181	CC 180PF K 63V	C714 C430 C439
201222	CC 220PF	C404

PART NUMBER	DISCRIPTION	POSITION
201223	CC 220PF 2KV	C121 C809
201331	CC 330PF K 63V	C433
201332	CC 330PF J 63V	C1212 C1213 C1214
201391	CC 390 PF	C 407
201471	CC 470PF 2KV	C807
201472	CC 470PF K 63V	C438 C440
201560	CC 560PF K 63V	C306
202105	CC 1NF 1KV	C135 C136 C137 C138
202106	CC 1NF 100V	CR701 C713 CT102 CT103 C720 C721 C722
204106	CC 100NF 63V	C724
209680	CC 6.8PF J 63V	C921
213684	C-PEM 68NF 250V	C133
240470	TAN.CAP. 4.7UF M 10V	C918 C919
250105	EC 1UF 100V	C112 C502 C417 C424 C425 C214 C216 C217
251115	EC 10UF 25V	C503 C717 C905 C910 C912 C201 C218
251116	EC 10UF	C401
251225	EC 22UF16V	C516
251478	EC 47UF 16V	C134 C1215 C419
251479	EC 47UF 25V	C110
251480	EC 47UF 250V	C122 C123 C810
252112	EC 100UF 16V	C444
252113	EC 100UF 25V	C304
252152	EC 150UF 385V	C103
252225	EC 220UF 25V	C801
252476	EC 470UF 25V	C301 C701
252477	EC 470UF 40V	C125 C126
253108	EC 1000UF 25V	C131
259223	EC 2.2UF 63V	C127 C130
259477	EC 4.7UF 40V	C505 C712 C1207 C207
259478	EC 4.7UF 250V	C1217
260140	C-TRIM 332PF	C420
271220	C-MFP 220PF 1600V	C116
271683	C-STRY 680PF %2 160V	—
272101	C-PEM INF 63V	C445
272151	C-PEM 1.5NF K 63V	C713
272221	C-PEM 2.2NF K 63V	C309 C310 C410 C411 C413
272330	C-PEM 3.3NF K 63V	C307 C703
272471	C-PEM 4.7NF K 63V	C111 C113 C91 C211
272472	C-PEM 4.7NF K 400V	C719
272681	C-PEM 6.8NF K 63V	C1216 C414 C422
273102	C-PEM 10NF K 63V	C504 C506 C507 C508 C509 C510 C511 C512 C925
273103	C-PPM 10NF K 250V	C808
273104	C-PPM 10NF J 1500V	C813
273108	C-POL 10NF K 400V	C517 C518 C519
273110	C-MKP 10NF K 1000V	C1219
273150	C-PEM 15NF K 63V	C711
273222	C-PEM 22NF K 250V	C909
273224	C-PEM 22NF K 63V	C710 C415 C421 C203 C212 C213
273331	C-PPM 33NF J 1000V	C115
273471	C-PEM 47NF K 63V	C803 C423 C432
273474	C-PEM 47NF K 250V	C1218
273681	C-PEM 68NF K 63V	C715
274104	C-PEM 100NF K 63V	C305 C901 C1211 C443 C202 C205 C206 C209 C215 C219
274106	C-PEM 100NF K 250V	C1202
274222	C-PEM 220NF K 63V	C909
274224	C-PEM 220NF 250V	C710
274330	C-PEM 330NF J 250V	C804
274332	C-PEM 330NF K 63V	C418 C429
274470	C-PEM .47UF J 200V (MPP)	C805
274471	C-PEM 470NF K 63V	C705 C208
274680	C-PEM 680NF 250V	C101
275100	C-PPM 1UF J 250V	C707
306305	DIODE BA157	D704
302289	DIODE 1N4148	D101 D102 D104 D501 D503 D901 D902 D201
302626	DIODE SFH205 IR	D904
302638	DIODE BY299	D109 D801
302939	DIODE 1N4002	D301 D701
302947	DIODE 1N4004	D1214
302984	DIODE BYW72	D110 D111 D112
303085	DIODE BZX55-C30	D61
303086	DIODE Z. BZX85-C6V2	D105
303087	DIODE C2540 BRIDGE	GR101
303093	DIODE BA159	D103
303104	DIODE BZX83 C4V7	D1208
303900	LED ROT	D903
400338	TRN BF422	T1203 T1205 T1207 T1211
400339	TRN BF423	T1208 T1209 T1210
400987	TRN BC548	T301 T901 T902 T903 T905 T906 T907 T401 T404 T405
400989	TRN BC558	T1201 T201 T203 T904
400990	TRN BF869G	T1202 T1204 T1206
400991	TRN BUZ90A	T101
400993	TRN BC635	T801
401003	TRN S2055F	T802
410015	THRY SCRESM740	T701
451463	IC TDA4605	IC 101
451464	IC TDA5931-4	IC 201
451465	IC SDA 2526	IC902
451467	IC TBA121	IC202
451468	IC TDA1037	IC301
451469	IC TDA4060	IC903
451508	IC TDA4580	IC501
451509	IC UPD6142	IC904
451510	IC TEA2029	IC701
451512	IC TDA4565	IC402
451516	IC TDA4555	IC401
451517	IC TDB7805CT (T0220CASE)	T103
451518	IC LM317T (T0220CASE)	T102
451765	IC SDA20160	IC901
500265	WASHER PLST 6*3*2.5	—
50S158	PAL/SECAM PLATE ASSY	—
50S164	CRT PLATE ASSY	—
50S221	BRACKET LED	—
50S305	HEAT SINK HORIZONTAL	—
50S306	HEAT SINK REGULATOR AT2	—
50S307	HEAT SINK SOUND AT2	—
50S308	HEAT SINK POWER AT2	—
520304	SPRING CRT EARTH LEAD	—
52N820	CIRCUIT DIAGRAM 90 PS/BG	—
52P110	CHASSIS 20" PS B/G-D/K	—
52P140	IF B/G-D/K ASSY	—
530307	CRT EARTHING HOOK	—
571925	PUSH CATCH NEW TYPE	—
597166	DEGAUSSING COIL 20"	—
597317	HEAT SINK 2-IC200	—
60U172	CONTROL UNIT ASSY	—
60U203	LENS LED	—
60U805	STROPOR TOP 20SI-BK00	—
60U806	STROPOR BOTTOM 20SI-BK00	—
60U902	RUBBER CONTACT-II 6KEY 20SI-BK00	—
60U903	RUBBER CONTACT-II 7KEY 20SI-BK00	—
70P258	KNOB POWER PAINTED	—
71S320	NAME PLATE BEK02 D.C 49.9*11.2*0.5	—
72W205	BACK COVER	—
72W251	FRONT COVER	—
72X136	TUNER TFK 2201 PKC-3x8630	—
72X261	CU DOOR PAINTED	—
72X800	GIFT BOX	—
850107	SPEAKER FOSTER	—
880187	R/C HANDSET ASSY BEK0-2 TX	—